

PTO Form 1930 (Rev 9/2007)

OMB No. 0651-0050 (Exp. 4/30/2009)

Request for Reconsideration after Final Action

The table below presents the data as entered.

Input Field	Entered
SERIAL NUMBER	77527093
LAW OFFICE ASSIGNED	LAW OFFICE 108
MARK SECTION (no change)	
ARGUMENT(S)	
<p style="text-align: center;">REQUEST FOR RECONSIDERATION</p> <p>This is in response to the final Office Action dated March 18, 2009.</p> <p style="text-align: center;">AMENDMENT</p> <p>Applicant has appointed the undersigned attorney to submit this Request for Reconsideration and a Notice of Appeal, which is being filed separately. Therefore, Applicant respectfully requests that the correspondence address be amended to the following:</p> <p style="text-align: center;">Max Moskowitz, Esq. OSTROLENK FABER LLP 1180 Avenue of the Americas 7th Floor New York, New York 10036</p> <p style="text-align: center;">Phone: (212) 382-0700 Fax: (212) 382-0888</p> <p style="text-align: center;">REMARKS</p> <p>In the Office Action dated September 8, 2008, the Examining Attorney refused registration of Applicant's mark because the identification of goods was unacceptable as indefinite and because there is a likelihood of confusion with the mark RUBY set forth in U.S. Registration No. 3,415,865.</p> <p>In Applicant's response dated March 3, 2009, Applicant amended the identification of goods to provide for the required specificity and argued against the likelihood of confusion refusal under Trademark Act Section 2(d), 15 U.S.C. § 1052(d).</p> <p>In the Office Action dated March 18, 2009, The Examining Attorney accepted the amendments to the identification of goods but continued and made final the refusal to register under Trademark Act</p>	

Section 2(d), 15 U.S.C. § 1052(d), based on a likelihood of confusion with the mark RUBY set forth in U.S. Registration No. 3,415,865.

For the reasons set forth below, Applicant submits that confusion with the mark RUBY set forth in U.S. Registration No. 3,415,865 is unlikely and respectfully requests that the Examining Attorney reconsider his refusal in light of the following arguments and additional evidence.

ARGUMENT

The Examining Attorney refused registration of Applicant's mark ROOBI on the basis of U.S. Registration No. 3,415,865 for the mark RUBY for energy drinks and non-alcoholic beverages containing fruit juices owned by Ruby, LLC.

In any likelihood of confusion analysis, two key considerations are the similarities between the marks and the similarities between the goods. In re Jump Designs LLC, 80 USPQ2d 1370, 1374 (TTAB 2006), citing Federated Foods, Inc. v. Fort Howard Paper Co., 544 F.2d 1098, 192 USPQ 24 (CCPA 1976).

A. Comparison of the Marks

Applicant's mark consists of the word ROOBI in standard characters.

The mark set forth in U.S. Registration No. 3,415,865 consists of the word RUBY in standard characters.

The Examining Attorney argues that Applicant's mark is similar to the cited mark in sound, meaning, connotation and commercial appearance. In its Response to Office Action dated March 3, 2009, which was filed by Applicant's prior counsel, Applicant argued that its mark is not similar to the registered mark because of the crowded field of "RUBY" marks and differences in appearances of the marks.

In the final Action mailed on March 18, 2009 the Examining Attorney concluded that both Applicant's mark and the cited mark when spoken would be pronounced as "ruby."

But, the test is not simply whether two marks are identical when spoken. In determining the similarity or dissimilarity of marks, we must consider the marks in their entireties in terms of appearance, sound, meaning and commercial impression. Wet Seal Inc. v. FD Management Inc., 82 USPQ 2d 1629, 1638 (TTAB 2007).

i. There is No Similarity in Appearance

Applicant's mark consists of the word ROOBI in standard characters. On the other hand, the cited mark consists of the word RUBY in standard characters. The appearance of both marks are different. Applicant's mark contains the letters "OO" and an "I" suffix. The cited mark consists of the word "Ruby" with an additional "Y." There are clearly distinguishing features between Applicant's mark and the cited mark that demonstrate the marks are not similar in appearance.

The Examining Attorney does not appear to dispute the fact that the marks do not appear visually similar.

ii. The Commercial Impressions Are Different

In its Response to Office Action dated March 3, 2009, since the Examining Attorney placed great emphasis on the purported similarity in sound, Applicant provided the Examining Attorney with a number of trademark registrations for marks that contained the word "RUBY" as a trademark term for beverages. Applicant argued that given the narrow scope protection afforded marks coexisting in a crowded field, the overall commercial impression of the mark is readily distinguishable. Applicant argued that consumers will look to other elements of the marks, such as Applicant's "OO" spelling and Registrant's use of an additional "Y", to distinguish the source of the goods. But, the Examining Attorney refused to accept this argument because Applicant did not address how consumers would view Applicant's mark in relation to the cited mark.

The cited mark "takes its name from the deep, rich flavor and color of the ruby blood orange." See Exhibit A, which consists of a screenshot of Registrant's web site. According to Registrant the blood orange is known for its vibrant, distinctive and explosive citrus flavors. As such, the mark is descriptive of an ingredient, quality or characteristic of Registrant's goods, namely, the color of Registrant's goods. The additional letter "Y" likely conveys to prospective purchasers that the product exudes an intense level of color. While Applicant's mark may sound like the word "ruby" upon viewing the mark for the first time, consumers are not likely to form any such association. As such, the commercial impression of the marks is not similar.

Additionally, in granting the numerous registrations discussed in Applicant's March 3, 2009 Response to Office, the Patent and Trademark Office has recognized the overall weakness of RUBY-related marks and that small differences in presentation are sufficient to avoid a likelihood of confusion over prior marks. Applicant submits that its mark should be evaluated according to the same standard. As the Board stated in *In re Styleclick.com Inc.* 57 USPQ2d 1445, 1447 (TTAB 2000): "Uniform treatment under the Trademark Act is an administrative goal." The Federal Circuit has endorsed this policy: "Needless to say, this court encourages the PTO to achieve a uniform standard for assessing registrability of marks." *In re Nett Designs, Inc.*, 236 F.3d 1339, 1342, 57 USPQ2d 1564, 1566 (Fed. Cir 2001). The co-existence of the numerous RUBY-related registrations "cannot summarily be dismissed on the ground that each case is dependent on its own particular set of facts and the specific marks involved." cf. *Faberge, Inc. v. Madison Shirt Corp.*, 192 USPQ 223, 227 (TTAB 1976). Applicant submits that the factual differences concerning its mark are not likely to be sufficiently compelling to justify the refusal to register in the face of the established Trademark Office precedent.

A potential applicant should be entitled to rely on the "uniform treatment" of marks by the Patent and Trademark Office. It is for this reason that trademark search reports are often obtained by applicants who review the Patent and Trademark Office's prior determinations with respect to pertinent marks. Such determinations are a significant factor in an applicant's decision whether to use a mark and file an application to register that mark. By refusing to register Applicant's mark, the Examining Attorney has disregarded the PTO's previously treatment in nearly identical circumstances.

B. Consumers of Beverages Are Sophisticated

The United States is the largest consumer market for bottled water in the world, followed by Mexico, China and Brazil. See Exhibits B and C. In 2008, bottled water sales in the United States exceeded 8.6 billion gallons, representing a 28.9% share of liquid refreshment sales in the United States. See Exhibits B and D. There are approximately 700 marks covering bottled water that are registered with the U.S. Patent and Trademark Office. See Exhibit E. With so many brands to choose from, such consumers are likely to be careful and discriminating in their purchasing decisions and are not likely

to be confused by marks for energy drinks, such as those of Registrant.

Energy drinks are typically marketed and designed to increase the consumer's mental alertness and physical performance through the addition of caffeine, vitamins and herbal supplements. See Exhibit F and, generally, Exhibit G. The packaging for such drinks often include the generic wording "energy drink." See Exhibits H and I. In fact, the specimen submitted in support of Registrant's Statement of Use demonstrates that its product is an "energy drink." See Exhibit J.

Water, on the other hand, is needed for the human body to function properly. See Exhibit K, in particularly the section titled "For Drinking." Depending on various factors, the human body requires between one and seven liters of water per day to avoid dehydration. *Id.* Thus, consumers who purchase water, whether simple bottled water, or water enhanced with antioxidants, purchase it for the purposes of restoring one's water levels or to quench one's thirst. Consumers, therefore, are not likely to be confused by a mark for an energy drink or water because they are discriminating. Consumers seeking out water seek it out for its nutritional value.

The C.A.F.C. has cautioned the P.T.O. not to overlook the great importance of consumer sophistication in deciding whether confusion is likely. The decision in *Electronic Design & Sales Inc. v. Electronic Data Systems Corp.*, 21 U.S.P.Q.2d 1388 (Fed. Cir. 1992) is instructive. The C.A.F.C. there held that confusion was unlikely between E.D.S. for computer services and EDS for power supplies and battery chargers because the buyers were sophisticated commercial purchasers. The C.A.F.C. strongly stressed that the sophistication of discriminating customers is an extremely important likelihood of confusion factor even in cases where the marks are identical. Indeed, the C.A.F.C. reversed the Board's finding of likely confusion because the Board "apparently failed to consider, and certainly failed to address, the sophistication of buyers." 21 U.S.P.Q.2d at 1392. The C.A.F.C. cited with approval an earlier and equally pertinent case, *Dynamics Research Corp. v. Langenau Mfg. Co.*, 217 U.S.P.Q. 649 (Fed. Cir. 1983) (holding no confusion likely between identical marks DRC for gauges for press brakes sold to the machine tool industry and DRC for sheet metal fabric sold to highway departments and airports for use as fencing). Here, the marks are not even identical.

With the above, Applicant submits that all questions have now been answered and respectfully requests that the mark be approved for publication.

EVIDENCE SECTION

EVIDENCE FILE NAME(S)

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FIRM NAME	Ostrolenk Faber LLP
STREET	1180 Avenue of the Americas, 7th Floor
CITY	New York
STATE	New York
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SIGNATURE SECTION	
RESPONSE SIGNATURE	/MM/
SIGNATORY'S NAME	Max Moskowitz
SIGNATORY'S POSITION	Attorney for Applicant, New York bar member
DATE SIGNED	09/15/2009
AUTHORIZED SIGNATORY	YES
CONCURRENT APPEAL NOTICE FILED	YES
FILING INFORMATION SECTION	
SUBMIT DATE	Tue Sep 15 18:35:34 EDT 2009
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Request for Reconsideration after Final Action**To the Commissioner for Trademarks:**

Application serial no. **77527093** has been amended as follows:

ARGUMENT(S)

In response to the substantive refusal(s), please note the following:

REQUEST FOR RECONSIDERATION

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AMENDMENT

Applicant has appointed the undersigned attorney to submit this Request for Reconsideration and a Notice of Appeal, which is being filed separately. Therefore, Applicant respectfully requests that the correspondence address be amended to the following:

Max Moskowitz, Esq.
OSTROLENK FABER LLP
1180 Avenue of the Americas
7th Floor
New York, New York 10036

Phone: (212) 382-0700
Fax: (212) 382-0888

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The Examining Attorney does not appear to dispute the fact that the marks do not appear visually similar.

ii. The Commercial Impressions Are Different

In its Response to Office Action dated March 3, 2009, since the Examining Attorney placed great emphasis on the purported similarity in sound, Applicant provided the Examining Attorney with a number of trademark registrations for marks that contained the word "RUBY" as a trademark term for beverages. Applicant argued that given the narrow scope protection afforded marks coexisting in a crowded field, the overall commercial impression of the mark is readily distinguishable. Applicant argued that consumers will look to other elements of the marks, such as Applicant's "OO" spelling and Registrant's use of an additional "Y", to distinguish the source of the goods. But, the Examining Attorney refused to accept this argument because Applicant did not address how consumers would view Applicant's mark in relation to the cited mark.

The cited mark "takes its name from the deep, rich flavor and color of the ruby blood orange." See Exhibit A, which consists of a screenshot of Registrant's web site. According to Registrant the blood orange is known for its vibrant, distinctive and explosive citrus flavors. As such, the mark is descriptive of an ingredient, quality or characteristic of Registrant's goods, namely, the color of Registrant's goods. The additional letter "Y" likely conveys to prospective purchasers that the product exudes an intense level of color. While Applicant's mark may sound like the word "ruby" upon viewing the mark for the first time, consumers are not likely to form any such association. As such, the commercial impression of the marks is not similar.

Additionally, in granting the numerous registrations discussed in Applicant's March 3, 2009 Response to Office, the Patent and Trademark Office has recognized the overall weakness of RUBY-related marks and that small differences in presentation are sufficient to avoid a likelihood of confusion over prior marks. Applicant submits that its mark should be evaluated according to the same standard. As the Board stated in *In re Styleclick.com Inc.* 57 USPQ2d 1445, 1447 (TTAB 2000): "Uniform treatment under the Trademark Act is an administrative goal." The Federal Circuit has endorsed this policy: "Needless to say, this court encourages the PTO to achieve a uniform standard for assessing registrability of marks." *In re Nett Designs, Inc.*, 236 F.3d 1339, 1342, 57 USPQ2d 1564, 1566 (Fed. Cir. 2001). The co-existence of the numerous RUBY-related registrations "cannot summarily be dismissed on the ground that each case is dependent on its own particular set of facts and the specific marks involved." cf. *Faberge, Inc. v. Madison Shirt Corp.*, 192 USPQ 223, 227 (TTAB 1976). Applicant submits that the factual differences concerning its mark are not likely to be sufficiently compelling to justify the refusal to register in the face of the established Trademark Office precedent.

A potential applicant should be entitled to rely on the "uniform treatment" of marks by the Patent and Trademark Office. It is for this reason that trademark search reports are often obtained by applicants who review the Patent and Trademark Office's prior determinations with respect to pertinent marks. Such determinations are a significant factor in an applicant's decision whether to use a mark and file an application to register that mark. By refusing to register Applicant's mark, the Examining Attorney has disregarded the PTO's previously treatment in nearly identical circumstances.

B. Consumers of Beverages Are Sophisticated

The United States is the largest consumer market for bottled water in the world, followed by Mexico, China and Brazil. See Exhibits B and C. In 2008, bottled water sales in the United States exceeded 8.6 billion gallons, representing a 28.9% share of liquid refreshment sales in the United States. See Exhibits B and D. There are approximately 700 marks covering bottled water that are registered with the U.S. Patent and Trademark Office. See Exhibit E. With so many brands to choose from, such consumers are likely to be careful and discriminating in their purchasing decisions and are not likely to be confused by marks for energy drinks, such as those of Registrant.

Energy drinks are typically marketed and designed to increase the consumer's mental alertness and physical performance through the addition of caffeine, vitamins and herbal supplements. See Exhibit F and, generally, Exhibit G. The packaging for such drinks often include the generic wording "energy drink." See Exhibits H and I. In fact, the specimen submitted in support of Registrant's Statement of Use demonstrates that its product is an "energy drink." See Exhibit J.

Water, on the other hand, is needed for the human body to function properly. See Exhibit K, in particularly the section titled "For Drinking." Depending on various factors, the human body requires between one and seven liters of water per day to avoid dehydration. *Id.* Thus, consumers who purchase water, whether simple bottled water, or water enhanced with antioxidants, purchase it for the purposes of

restoring one's water levels or to quench one's thirst. Consumers, therefore, are not likely to be confused by a mark for an energy drink or water because they are discriminating. Consumers seeking out water seek it out for its nutritional value.

The C.A.F.C. has cautioned the P.T.O. not to overlook the great importance of consumer sophistication in deciding whether confusion is likely. The decision in *Electronic Design & Sales Inc. v. Electronic Data Systems Corp.*, 21 U.S.P.Q.2d 1388 (Fed. Cir. 1992) is instructive. The C.A.F.C. there held that confusion was unlikely between E.D.S. for computer services and EDS for power supplies and battery chargers because the buyers were sophisticated commercial purchasers. The C.A.F.C. strongly stressed that the sophistication of discriminating customers is an extremely important likelihood of confusion factor even in cases where the marks are identical. Indeed, the C.A.F.C. reversed the Board's finding of likely confusion because the Board "apparently failed to consider, and certainly failed to address, the sophistication of buyers." 21 U.S.P.Q.2d at 1392. The C.A.F.C. cited with approval an earlier and equally pertinent case, *Dynamics Research Corp. v. Langenau Mfg. Co.*, 217 U.S.P.Q. 649 (Fed. Cir. 1983) (holding no confusion likely between identical marks DRC for gauges for press brakes sold to the machine tool industry and DRC for sheet metal fabric sold to highway departments and airports for use as fencing). Here, the marks are not even identical.

With the above, Applicant submits that all questions have now been answered and respectfully requests that the mark be approved for publication.

EVIDENCE

Evidence in the nature of Exhibits A-K has been attached.

Original PDF file:

http://tgate/PDF/RFR/2009/09/15/20090915183534069584-77527093-011_001/evi_21619520366-183036402_-_ROOBI_-_RFR_-_EX_A.PDF

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Evidence-2

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Evidence-1

Evidence-2

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Evidence-4

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Evidence-6

Evidence-7

Evidence-8

Evidence-9

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Evidence-3

Evidence-4

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[Evidence-2](#)

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[Evidence-6](#)

[Evidence-7](#)

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[Evidence-6](#)

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[Evidence-8](#)

[Evidence-9](#)

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[Evidence-12](#)

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[Evidence-16](#)

[Evidence-17](#)

[Evidence-18](#)

[Evidence-19](#)

[Evidence-20](#)

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[Evidence-24](#)

[Evidence-25](#)

[Evidence-26](#)

[Evidence-27](#)

CORRESPONDENCE ADDRESS CHANGE

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SIGNATURE(S)

Request for Reconsideration Signature

Signature: /MM/ Date: 09/15/2009

Signatory's Name: Max Moskowitz

Signatory's Position: Attorney for Applicant, New York bar member

The signatory has confirmed that he/she is an attorney who is a member in good standing of the bar of the highest court of a U.S. state, which includes the District of Columbia, Puerto Rico, and other federal territories and possessions; and he/she is currently the applicant's attorney or an associate thereof; and to the best of his/her knowledge, if prior to his/her appointment another U.S. attorney or a Canadian attorney/agent not currently associated with his/her company/firm previously represented the applicant in this matter: (1) the applicant has filed or is concurrently filing a signed revocation of or substitute power of attorney with the USPTO; (2) the USPTO has granted the request of the prior representative to withdraw; (3) the applicant has filed a power of attorney appointing him/her in this matter; or (4) the applicant's appointed U.S. attorney or Canadian attorney/agent has filed a power of attorney appointing him/her as an associate attorney in this matter.

The applicant is filing a Notice of Appeal in conjunction with this Request for Reconsideration.

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Serial Number: 77527093

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Exhibit A

Exhibit B

Bottled water

From Wikipedia, the free encyclopedia

Bottled water is drinking water packaged in plastic or glass containers. The dominant form is water packaged in new Polyethylene terephthalate bottles and sold retail. Another method of packaging is in larger high-density polyethylene plastic bottles, or polycarbonate plastic bottles, often used with water coolers.



New PETE bottled water

Contents

- 1 Global sales
- 2 Effects of bottled water
 - 2.1 Waste
 - 2.2 Health effects
- 3 Bottled water in the marketplace
 - 3.1 Bottled water vs. carbonated beverages
 - 3.2 Bottled water vs. tap water
 - 3.3 Bottled water service
 - 3.4 Purified water vending machines
- 4 Bottled water by region
 - 4.1 Australia
 - 4.2 European Union
 - 4.3 United States
 - 4.3.1 Sales
 - 4.3.2 Sources
 - 4.3.3 Regulation
- 5 Pakistan
- 6 Bottled water in popular culture
- 7 See also
- 8 References
- 9 External links

Global sales

The global bottled water market valuation grew by 7% in 2006 to reach a value of \$60,938.1 million. The volume of bottled water grew by 8.1% in 2006 to 115,393.5 million liters. In 2011, the market is forecast to have a value of \$86,421.2 million, an increase of 41.8% since 2006. In 2011, the market is forecast to have a volume of 174,286.6 million liters, an increase of 51% since 2006.^[1]

The global rate of consumption more than doubled between 1997 and 2005.^[2] Purified water is currently the leading global seller, with U.S. companies dominating the field, and natural spring water, purified water and flavored water being the fastest-growing market segments.^[3]

Effects of bottled water

Waste

One major criticism of bottled water concerns the bottles themselves. Individual use bottled water is generally packaged in Polyethylene terephthalate (PET). According to a NAPCOR study, PET water bottles account for 50% of all the PET bottles and containers collected by curbside recycling, and the recycling rate for water bottles is 23.4%, an increase over the 2006 rate of 20.1%. PET bottled water containers make up one-third of 1 percent of the waste stream in the United States.^[4]



A large pile of Poland Spring bottles

The International Bottled Water Association also reports that the average weight of a plastic bottle water was 13.83 grams in 2007, compared to 18.90 grams in 2000, representing a 26.7% decline.^[5] Pepsi-Co has since introduced a bottle weighing 10.9 grams and using 20 percent less plastic, which it says is the lightest bottle of its kind that is nationally distributed.^[6]

An estimated 50 billion bottles of water are consumed per annum in the US and around 200 billion bottles globally.^[7] If all of these bottles were lined up together they would stretch to the Moon and back 56 times.^[8]

Health effects

Bottled water processed with distillation or reverse osmosis lacks fluoride ions which are sometimes naturally present in ground water. The drinking of distilled water may conceivably increase the risk of tooth decay due to a lack of this element.^[9]

According to a 1999 NRDC study, at least 22 percent of brands tested, at least one sample contained chemical contaminants at levels above strict state health limits. Some of the contaminants found in the study could pose health risks if consumed over a long period of time.^[10] However, the NRDC report conceded that "[m]ost waters contained no detectable bacteria, and the levels of synthetic organic chemicals and inorganic chemicals of concern for which were tested were either below detection limits or well below all applicable standards."^[11] Meanwhile, a report by the Drinking Water Research Foundation found that of all samples tested by NRDC, "federal FDA or EPA limits were allegedly exceeded only four times, twice for total coliforms and twice for fluorides."^[12]

The rate of total dissolved solids is sometimes 4 times higher in bottled mineral waters than in bottled tap ones. High amounts of calcium in mineral bottled waters for example mean that a daily and excessive consumption may result in hypercalcemia, which highly increases the risk of kidney or gallstones.

Another study, conducted by the Goethe University at Frankfurt found that a high percentage of the

bottled water, contained in plastic containers were polluted with estrogenic chemicals. Although some of the bottled water contained in glass were found polluted with chemicals as well, the researchers believe some of the contamination in the plastic containers may have come from the plastic containers themselves.^[13]

Bottled water in the marketplace

The Beverage Marketing Corporation defines the bottled water market segment as "retail PET, retail bulk, home and office delivery, vending, domestic sparkling and imports" but excluding "flavored and enhanced water."^[14]

Bottled water vs. carbonated beverages

Bottled water competes in the marketplace with carbonated beverages sold in individual plastic bottles,^[15] and is often considered a healthier substitute.^[16]

According to the Container Recycling Institute, sales of flavored, noncarbonated drinks are expected to surpass soda sales by 2010.^[17] In response, Coca-Cola and PepsiCo have introduced new carbonated drinks that are fortified with vitamins and minerals, Diet Coke Plus and Tava, marketed as "sparkling beverages."^[18]

Bottled water vs. tap water

In the United States, bottled water costs between \$0.25 and \$2 per bottle while tap water costs less than a penny.^[19] In 1999, according to a NRDC study, U.S. consumers paid between 240 and 10,000 times more per gallon for bottled water than for tap water.^[11] According to Bottledwaterblues.com, about 90% of manufacturer's costs is from making the bottle, label, and cap.^[20]

The Natural Resources Defense Council, Sierra Club and World Wildlife Fund have all urged their supporters to consume less bottled water. Anti-bottled water campaigns and organizations, such as Corporate Accountability International, typically argue that bottled water is no better than tap water, and emphasize the environmental side-effects of disposable plastic bottles.

The Showtime series *Penn & Teller: Bullshit!* demonstrated, in a 2007 episode, that in a controlled setting, diners could not discern between bottled water and water from a garden hose behind the restaurant.^[21]

The United Church of Christ, United Church of Canada, National Council of Churches, National Coalition of American Nuns and Presbyterians for Restoring Creation are among some of the religious organizations that have raised questions about whether or not the "privatization" of water is ethical. They regard the industrial purchase and repackaging at a much higher resale price of a basic resource as an unethical trend.^[22]



An office water cooler with a reusable 5-gallon bottle

In Finland, the newspaper *Helsingin Sanomat* once ran a blind tasting test containing various brands of bottled water, both Finnish and international, and regular tap water from Helsinki. The majority of the tasters preferred the tap water.

Bottled water service

It is not uncommon for business or individuals to subscribe to a bottled water service. Instead of selling drinking water in small individual-use bottles, the service supplies it in large, reusable (in the USA, typically 5 US gallons) containers. The containers are installed on a dispenser (or "cooler") which chills or heats the water and generally has valves on the front for dispensing. This practice eliminates the issue of disposing of packaging for individual serves while still providing the same product.

Purified water vending machines

A number of companies worldwide, among which are a number of North American supermarket chains, have vending machines that dispense purified water into customer's own containers. This again obviates the costs and environmental issues involved in manufacturing, transporting, and disposing of plastic bottles.



Bottle-less drinking water vending machine in Pattaya, Thailand. Customers bring their containers.

Bottled water by region

Australia

In what may be the first case globally, the New South Wales town of Bundanoon voted to outlaw bottled water.^[23]

The Australasian Bottled Water Institute is a regional member of the International Council of Bottled Water Associations.

European Union

European Directive 80/777/EEC^[24] – modified by Directive 96/70/EC^[25] – deals with the marketing and exploitation of natural mineral waters in the European Union. The two main types of bottled water recognized are mineral water and spring water.

Broadly speaking, "mineral water" is groundwater that has emerged from the ground and flowed over rock. Treatment of mineral water is restricted to removal of unstable elements such as iron and sulfur compounds. Treatment for such minerals can only extend to filtration or decanting with oxygenation. Free carbon dioxide may be removed only by physical methods, and the regulations for introduction (or reintroduction) of CO₂ are strictly defined. Disinfection of natural mineral water is completely prohibited, including the addition of any element that is likely to change bacterial colony counts. If natural mineral is effervescent, it must be labelled accordingly, depending on the origin of the carbon dioxide: naturally carbonated natural mineral water (no introduction of CO₂); natural mineral water fortified with gas from the spring (reintroduction of CO₂); carbonated natural mineral water (CO₂ added following strict guidelines).

Council Directive 65/65/EEC^[26] deals with bottled water that is considered a "medicinal product" and is thus excluded from the scope of the other regulation.

United States

Sales

The U.S. is the largest consumer market for bottled water in the world, followed by Mexico, China, and Brazil.^[3] In 2008, U.S. bottled water sales topped 8.6 billion gallons for 28.9% of the U.S. liquid refreshment beverage market, exceeding sales of all other beverages except carbonated soft drinks, followed by fruit juices and sports drinks.^[14] Americans drink 21 gallons of bottled water per capita per year.^[27]

Sources

About 25% of U.S. bottled water sold is purified municipal water according to a four-year study by the Natural Resources Defense Council (NRDC).^[28] Both Aquafina from PepsiCo and Dasani from The Coca-Cola Company originate from municipal water systems.^[29] However according to the FDA, about 75 percent of bottled water sold in the U.S. comes from other sources, including "natural underground sources, which include rivers, lakes, springs and artesian wells." Federal regulations also require that the standard of identity be noted on the bottle label.

Regulation

In the United States, bottled water is regulated by the Food & Drug Administration according to standards of identity, standards of quality and good manufacturing practices.^{[30][31][32]}

Standards of identity define types of water for labeling purposes. To be called ground water, the water must not be under the direct influence of surface water. Water containing not less than 250 parts per million of total dissolved solids are mineral water. Artesian water comes from a well tapping a confined aquifer in which the water level stands at some height above the top of the aquifer; it may be collected with the assistance of external force to enhance the natural underground pressure. Water that has been produced by distillation, deionization, reverse osmosis or similar processes are purified or demineralized water. Sparkling water contains the same amount of carbon dioxide that it had at emergence from the source, although it may be removed and replenished in treatment. Spring water must be derived from an underground formation from which water flows naturally to the Earth's surface. Sterile water water meets the requirements under "sterility tests" in the United States Pharmacopoeia. Well water is water that has been removed from a hole bored or drilled in the ground which taps into an aquifer.

Standards of quality regulate acceptable levels of the water's turbidity, color and odor, according to sample analysis. Exemptions are made according to aesthetically-based allowable levels, and do not relate to health concerns. An example is mineral water, which is exempt from allowable color levels.^[32]

Pakistan

Due to contaminated water being widespread, in the mid 1990s urban families started installing filtration

units at home. This later developed into companies providing mineral water delivery services at home. These gallon bottles that could be attached to a dispenser are still widespread.

Bottled water was made famous by one of the largest marketing campaigns in Pakistan history undertaken by Nestle. Eventually other bottlers including dozens of local ones, Coca Cola, Pepsi and other imported brands such as Evian also made their way.

It must be remembered that a survey conducted by the government showed that none of the bottlers in Pakistan maintained WHO standards while bottling mineral water, although not a health issue, three of these companies' products were 'unsafe' for human consumption.

Bottled water in popular culture

Fiji Water has actively sought product placement in popular movies and TV shows, including *Desperate Housewives*, *Entourage*, *The Office*, *Friends* and *Sex and the City*. In the 2005 movie *Jesus is Magic*, comedian Sarah Silverman lampoons behavior of show business prima donnas with a tirade declaring she will drink only Fiji Water.^[33]

In the TV show *Monk*, Adrian Monk is known to only drink water that is of the Sierra Springs brand. In the episode *Mr. Monk Goes To Mexico*, Monk went thirsty for days because he couldn't find any Sierra Springs water.

See also

- Australasian Bottled Water Institute (ABWI)
- International Bottled Water Association
- Reuse of water bottles

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External links

- International Bottled Water Association (<http://www.bottledwater.org/>)
- British Bottled Water Producers (<http://www.britishbottledwater.org>)
- BottledWaterBlues.com (<http://www.bottledwaterblues.com>)
- Ask Pablo (<http://www.triplepundit.com/2007/02/whats-the-true-environmental-cost-of-fiji-water>) - Original "Cost of Fiji Water" Article which triggered controversy
- San Francisco Department of Public Health Bottled Water Fact Sheet (http://www.sfphe.org/water/FactSheets/bottled_water.htm)
- Environmental Protection Agency Water Health Series: Bottled Water (http://www.epa.gov/safewater/faq/pdfs/fs_healthseries_bottledwater.pdf)

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Categories: [Backpacking](#) | [Bottled water brands](#) | [Survival skills](#)

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[to be expanded](#) | [All pages needing cleanup](#) | [Wikipedia articles needing clarification from May 2009](#) |

[Articles with unsourced statements from August 2009](#)

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21/05/2008

Changing Consumer Tastes Creates Explosive Growth For Domestic And International Bottled Water Brands – Revenue In 2007 Expected To Reach \$5.974 Billion With Growth Set To Climb Higher Through 2012

With another sweltering summer forecast for 2008, IBISWorld, Inc., today revealed the hot trends that are driving growth in the burgeoning, multi-billion dollar bottled water industry – and two worldwide mega brands are bound to benefit – Coca-Cola Enterprises, Inc., and The Pepsi Bottling Group. From fashion, to flavour, to function, the outlook for the bottled water industry is bright, yet there are some issues with regard to purity and value that marketers will face in the foreseeable future. IBISWorld, Inc., (www.ibisworld.com) is recognized as one of the nation's most respected independent publishers of business intelligence research.

Profit In A Bottle

This financial year, IBISWorld expects the global soft drink and bottled water manufacturing industry will produce revenue of \$146.5 billion, with growth expected to continue at a rate of four percent, with the U.S. at its forefront, producing revenue of an estimated \$168.6 billion by 2012.

Driving this growth is the global rate of consumption rising by 10 percent in 2007.

And at the forefront of the industry, selling purified water aimed at the low-cost, bulk purchase market, are U.S. companies bottlers Coca-Cola Enterprises, Inc., and The Pepsi Bottling Group. Both companies are dominating the arena through aggressive marketing programs that have turned both the Aquafina and the Dasani brands into block-buster successes. Driven largely by health consciousness consumers with strong disposable income, and warm weather, the bottled water market has been identified by IBISWorld as being the fastest growing beverage segment in the U.S., with the market share for bottled water increasing from 11.7 percent in 2005 to 14.5 percent in 2007, and producing revenue of \$5.974 billion for fiscal year 2007.

Purified water is currently the leading global seller, with U.S. companies dominating the field. The U.S. is the largest consumer market for water the world, followed by Mexico, China, and Brazil. Natural spring water, purified water, and flavoured water, have been identified by IBISWorld as the fastest growing segments.

Designer Drops

"But there's more to the industry's strong performance than meets the eye, according to Senior Analyst with IBISWorld Mr. George Van Horn. "Because of the homogenous nature of the product, producers need to invest substantially in branding, advertising, and promotional activity to differentiate their offering, and to attract and retain consumers who would otherwise substitute readily between waters," said Mr. Van Horn. "As a result, we're seeing growth in the so-called 'premium' section of the industry, with some manufacturers promoting their water as superior in an attempt to extract higher margins." He added, "This has led to an increase in the market for imported products, as is demonstrated by the success of café-focused European brands such as Perrier and San Pellegrino, and the recent success of Fiji water in the U.S."

"In the U.S., the supply market is largely geared toward the production of purified water, to be sold in bulk – often through supermarkets and small retailing stores," said Mr. Van Horn. "And while this has spurred the dominance of the U.S. as a global market supplier, providing low cost, bulk purchase water to local and international markets, the growing trend towards fashionable, premium products may see more infiltration from imported brands within the U.S."

Mr. Van Horn explained that following trends abroad, bottled water had the potential to become as much a fashion accessory as a beverage, predicting savvy producers will establish niche operations supplying limited market segments with specialized and top-of-the line products.

"The current mediascape, particularly women's magazines, is saturated with images of celebrities flaunting premium water products in fashionable designer bottles," he said. "This has particularly been the case with Fiji water, with celebrity uptake no doubt contributing largely to the brand's success in the U.S."

"Females and younger consumers account for slightly larger levels of bottled water consumption, with media support behind a brand, the bottle design, and the label all playing a part," said Mr. Van Horn. "Women are also more diligent than men at drinking the recommended eight glasses of water a day, as well as being, on the whole, more health conscious."

Function Over Fashion

Alongside premium waters, 'functional' water is another area that is driving industry revenue, with products making unique health claims targeting consumers who switch drinks during the day depending upon their immediate needs.

"The creation and promotion of sports waters and other near waters has helped bottled water win market share from high-sugar soft drinks, energy drinks, and sports drinks," he said, anticipating that this trend will continue," said Mr. Van Horn.

Functional waters – encompassing sports, flavoured, near and enhanced waters – compete as substitutes for soft drinks, as they are

flavoured but do not have a high sugar content found in soft drinks. IBISWorld believes that as the industry matures and consumers become more informed, these sub-segments should become more clearly defined in the market.

"The rapid introduction of new products, and new packaging, make the bottled water market an extremely dynamic industry, and America's high level of carbonated soft drinks (CSD's), energy drinks, and sports drinks, and comparatively low-level of consumption of premium and enriched water products suggests that the U.S. market still has potential for a high rate of sales growth before reaching saturation," Mr. Van Horn added.

Water To Go

The bottled water industry has gained from the increasingly frantic pace of life. "With people trying to accomplish more each day, with less time for rest, and the rising preference for convenient snacks, dining out and takeaway meals, bottled waters are becoming an important convenient fact of life," explained Mr. Van Horn.

Are All Bottled Water Brands Safe and Pure?

And though most brands of bottled water have been tested and shown to have no health benefits above those of tap water, many consumers won't be convinced. In fact, consumers are increasingly worried about the quality of bottled water that is often bottled using the same municipal water supplies that come out of home tap water.

"Following a recently released report based on a five-month undercover story, the Associated Press (AP) revealed that a vast array of pharmaceuticals have been found in the drinking water supplies of millions of Americans," said Mr. Van Horn. "What most consumers don't know is that most brands of bottled water undergo no filtration during the bottling process. Many bottled water brands are essentially the same quality that comes from everyday home tap water. Consumers are essentially buying a brand, a nice label, and the convenience."

Members of the AP Investigative Team reviewed hundreds of scientific reports, analysed Federal drinking water databases, visited environmental study sites, treatment plants, and interviewed more than 230 officials, academics and scientists across the U.S.

What they found was alarming. For example, officials in Philadelphia said testing there discovered 56 pharmaceuticals, or drug by-products in treated drinking water, including medicines for pain, infection, high cholesterol, asthma, epilepsy, diabetes, heart disease, and mental illness. Sixty-three pharmaceuticals or by-products were found in the city's watersheds.

At a conference last summer, Mary Buzby, director of environmental technology for Merck & Co. Inc., said: "There's no doubt about it, pharmaceuticals are being detected in the environment and there is genuine concern that these compounds, in the small concentrations that they're at, could be causing impacts to human health or to aquatic organisms."

"We know we are being exposed to other people's drugs through our drinking water, and that cannot be good," says Dr. David Carpenter, who directs the Institute for Health and the Environment of the State University of New York at Albany. While the bottled water industry is beginning to address this issue, according to the EPA, currently there are no sewage treatment systems specifically engineered to remove pharmaceuticals.

According to Mr. Van Horn, not all bottled water is laced with various pharmaceutical drugs. "Brands like Fuji Water, Evian, and many other premium brands are bottled from water sources that are found in remote places such as in the mountains where pharmaceutical drugs from human waste don't exist."

Tougher Times Ahead?

Looking ahead beyond safety issues, Mr. Van Horn said there will be significant challenges facing the industry, mostly in the form of increasing infrastructure in developing countries, competition from premium labels and imports, and competition from low-calorie, sugar free carbonated soft-drinks (CSD's) and energy drinks, as well as dental care and environmental concerns, and mounting packaging costs.

Mr. Van Horn added, "Within the U.S. suppliers currently focus on the production of low cost purified water, a market that is largely supported by developing countries, and concerns about the quality of tap water rather than fashion or brand loyalty."

"In the coming years, due to developments in infrastructure in these countries, we may see great improvement in the quality of public water sources which may detract from further growth," predicted Mr. Van Horn.

"The U.S. is also still the major consuming country of soft drinks in the world with Americans consuming around 51.4 gallons of carbonated soft drinks per person each year, while at the same time Americans are becoming increasingly health-conscious. With that, the bottled water market increasingly finds itself competing with low-calorie, sugar free CSD's, and nutrient-enriched energy and so-called sports drinks.

"As consumption of bottled water by children increases, so too will concerns about the impact on their teeth - with tap water currently providing their main source of fluoride," said Mr. Van Horn. "Increasing environmental awareness, and concerns about the effects of manufacturing bottled water will also place pressure on the industry - with studies showing that it can take up to seven quarts of water and a quart of crude oil to produce about one quart of bottled water."

"In addition, over the next few years packaging costs, particularly for petroleum-based PET resin, will rise, putting pressure on profit margins. This is another reason why manufacturers will ramp up investment in developing higher priced premium spring waters and functional waters to partially offset cost pressures," Mr. Van Horn added.

Yet on the flip side, IBISWorld predicts these changing trends will surely see dominant U.S. players Coca-Cola Enterprises, Inc. and The Pepsi Bottling Group moving forward in the premium water market, creating new products focusing on nutrient enriched and flavoured water products and adopting fashionable packaging to appeal to the style-conscious. A move, which coupled with strong marketing campaigns, and the brand strength already achieved by these companies, could lead to U.S. premium water brands expanding more aggressively into the South American, Asian and Australian premium product markets.

About IBISWorld

Founded in 1972, IBISWorld provides a unique and extensive online portfolio of business research and analysis products designed to serve a range of business, professional service and government organizations. Delivered through enterprise subscriptions, the company publishes in-depth reports on more than 700 industries and offers profiles on more than 8,000 U.S. companies. In addition, the company provides databases of economic analysis, demographic data, and risk assessment reports relevant to virtually every business sector. IBISWorld's materials are valued for the breadth and depth of the research and analysis covering the entire U.S. economy, incorporating both financial and non-financial information impacting tracked industries and companies. IBISWorld Business Information is well known for its accuracy, consistency and timeliness. This is why almost all online information aggregators seek us out to include our reports as part of their global databases. Current IBISWorld partners include Hoovers, Valuation Resources, Superfactory and American Small Business Development Centers. With U.S. headquarters located in Los Angeles, IBISWorld has offices in New York, Melbourne, and Sydney. For more information, visit www.ibisworld.com or call 1-800-330-3772.

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Exhibit D

U.S. LIQUID REFRESHMENT BEVERAGE MARKET

Volume by Segment

2007 - 2008

2008 Segments	Rank	Millions of Gallons			% Change	Share of Volume	
		2007	2008	2007/08		2007	2008
Carbonated Soft Drinks	1	14,688.0	14,232.6	-3.1%	48.0%	47.5%	
Bottled Water**	2	8,757.4	8,672.9	-1.0%	28.6%	28.9%	
Fruit Beverages	3	4,009.3	3,928.2	-2.0%	13.1%	13.1%	
Sports Drinks	4	1,361.1	1,318.6	-3.1%	4.5%	4.4%	
Ready-to-Drink Tea	5	875.1	859.3	-1.8%	2.9%	2.9%	
Flavored and Enhanced Water	6	506.1	548.1	8.3%	1.7%	1.8%	
Energy Drinks	7	395.7	365.9	9.0%	1.1%	1.2%	
Ready-to-Drink Coffee	8	46.8	47.5	1.6%	0.2%	0.2%	
TOTAL		30,579.4	29,973.2	-2.0%	100.0%	100.0%	

* Includes retail PET, retail bulk, home and office delivery, vending, domestic sparkling and imports; excludes flavored and enhanced water.

Source: Beverage Marketing Corporation

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女
女

Beverage Marketing Corporation

2500 Broadway, New York, NY 10022
 Long Island City, New York 11101

Tel 902-275-4630 Outside US: 212-688-7840 Fax: 212-538-1255

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Index

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Exhibit E



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Refine Search ((bottled)ADJ(water))[GS] and (Live)[LD] and Submit

Current Search: S1: ((bottled)ADJ(water))[GS] and (Live)[LD] and 'RD docs: 692 occ: 2168
 > "18000101"

	Serial Number	Reg. Number	Word Mark	Check Status	Live/Dead
1	79056548	3658261	LOVE ONE	TARR	LIVE
2	79036970	3631473	THE ONE FOUR ALL FOUNDATION	TARR	LIVE
3	79054688	3654894	DRINKNEXT	TARR	LIVE
4	79055639	3643736	FILLICO	TARR	LIVE
5	79057020	3591552	DESCENT	TARR	LIVE
6	79039024	3423193	ANOTHER BLOODY WATER	TARR	LIVE
7	79015511	3286499	HAJI	TARR	LIVE
8	79041449	3485173	LIZIYUAN	TARR	LIVE
9	79033060	3468042	RESVIDA	TARR	LIVE
10	79037132	3445442	CARA & CO	TARR	LIVE
11	79027760	3436185	THE FUN YUM FRIENDS	TARR	LIVE
12	79031496	3335524		TARR	LIVE
13	79031495	3335523	AQUAQUEEN	TARR	LIVE
14	79024449	3233714	VIRGA PURE TASMANIAN WATER	TARR	LIVE
15	79003439	3021134		TARR	LIVE
16	78656885	3667855	VORSONG	TARR	LIVE
17	78585333	3220650	DRINK WATER, NOT SUGAR	TARR	LIVE
18	78506793	3181686	HINT KIDS	TARR	LIVE
19	78506784	3184565	HINT	TARR	LIVE
20	78886565	3662067	SUGARGUARD	TARR	LIVE
21	78926390	3659489	WET BY LIQUID LICKS SPRING WATER	TARR	LIVE
22	78852491	3651180	DETOX WITH EVIAN	TARR	LIVE
23	78533147	3652623	LIVE BETTER DRINK BETTER	TARR	LIVE

24	78662546	3185994		TARR	LIVE
25	78749200	3326809	CUMBY'S	TARR	LIVE
26	78890373	3628922	FIRST QUALITY	TARR	LIVE
27	78653463	3095696	PUT THE BEST WATER IN YOUR BODY	TARR	LIVE
28	78653423	3093310	TRINITY ENHANCED	TARR	LIVE
29	78821250	3604441	ICIO WATER	TARR	LIVE
30	78555146	3182060	US BOTTLING	TARR	LIVE
31	78533149	3581665	TO A HEALTHY LIFE	TARR	LIVE
32	78973260	3576282	UNIQUE	TARR	LIVE
33	78918695	3570119	FLATHEAD LAKE GOURMET SODA	TARR	LIVE
34	78847216	3555377	STRATFORD BOTTLING COMPANY	TARR	LIVE
35	78680500	3235449	O2 AQUA SUPER OXYGENATED	TARR	LIVE
36	78979489	3496094	EVIAN COOL-PACK	TARR	LIVE
37	78516016	3495970	LILLY PULITZER	TARR	LIVE
38	78525533	3486185	PURELY REFRESHING	TARR	LIVE
39	78610746	3276802	IT'S ABOUT YOU	TARR	LIVE
40	78924124	3478489	FLOWER WATER	TARR	LIVE
41	78958556	3455820	MÉRYA	TARR	LIVE
42	78958544	3455819	MÉRYA	TARR	LIVE
43	78646059	3179719	THE LAST BEST WATER	TARR	LIVE
44	78980216	3443100		TARR	LIVE
45	78594898	3442295	BLESSED HAWAIIAN WATER	TARR	LIVE
46	78980185	3438438	LIGHT & FIT	TARR	LIVE
47	78892939	3438203	KARMA CREATIVES	TARR	LIVE
48	78842283	3428498	DOG GONE IT WATER	TARR	LIVE
49	78778470	3253139	ALTA COFFEE SERVICE	TARR	LIVE
50	78979487	3414688	EVIAN COOL-PACK	TARR	LIVE
51	78711208	3188252	AGE20	TARR	LIVE
52	78844619	3413199	BELLA VITA	TARR	LIVE
53	78829885	3413151	WATER A WEIGH	TARR	LIVE
54	78629699	3225801	H2ULTRA	TARR	LIVE
55	78631777	3090085	VIVO	TARR	LIVE
56	78608527	3389809	READY SPOUSE	TARR	LIVE
57	78608538	3382849	READY TEEN	TARR	LIVE
58	78978450	3292366	TWIN CITY	TARR	LIVE
59	78967897	3272423	H2B	TARR	LIVE
60	78965844	3264873	H2B	TARR	LIVE
61	78934495	3244878	ANITA	TARR	LIVE
62	78893988	3362430	LIQUID OM	TARR	LIVE
63	78867375	3354124	FREEDOM	TARR	LIVE
64	78864839	3363606	TRINISOL	TARR	LIVE
65	78857547	3279693	PROMOTESOURCE	TARR	LIVE
66	78832249	3193873	RIPPLING SPRINGS	TARR	LIVE
67	78818969	3174202	BALANCED FOR BETTER LIVING	TARR	LIVE

68	78816285	3314361	EQUAL	TARR	LIVE
69	78812381	3309480	LIGHT 'N FIT	TARR	LIVE
70	78812368	3304372	DRINK LIGHT 'N FIT. BE LIGHT 'N FIT.	TARR	LIVE
71	78811211	3249188	ELECTROTEMP	TARR	LIVE
72	78795321	3180703		TARR	LIVE
73	78795310	3334624	UNDERDOG COFFEE	TARR	LIVE
74	78769992	3229272	"THE WATER GUY" SHINN SPRING WATER CO. WWW.WATERGUYS.COM 1-800-924-6841	TARR	LIVE
75	78766053	3165178	EWO	TARR	LIVE
76	78765419	3243967	EAU DE VIE	TARR	LIVE
77	78761898	3314051	ISBOKS	TARR	LIVE
78	78758611	3357497	FLO GET INTO YOUR FLO	TARR	LIVE
79	78750239	3262949	QUINTESSE	TARR	LIVE
80	78716834	3138810	VIBRANTE BLEU WATER	TARR	LIVE
81	78711283	3210510	PURIFIQUE	TARR	LIVE
82	78707558	3196155	TELLITALIA	TARR	LIVE
83	78699176	3135564	MIDAS PURITY CERTIFIED	TARR	LIVE
84	78691031	3259384	CAZONA	TARR	LIVE
85	78687896	3073663	SH	TARR	LIVE
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87	78657458	3116835	DOGGEAU	TARR	LIVE
88	78657457	3114129	FIDEAU	TARR	LIVE
89	78654817	3098157	MIDAS SPRING	TARR	LIVE
90	78654348	3098145	MIDAS	TARR	LIVE
91	78654203	3317202	WATER WITH A TWIST	TARR	LIVE
92	78652132	3098083	HIP HOP	TARR	LIVE
93	78651746	3228782	ST. GREGOR	TARR	LIVE
94	78643746	3178736	PURE SWISS	TARR	LIVE
95	78639861	3103692	HOOAH2O	TARR	LIVE
96	78638402	3175666	BAILOUT BAGS	TARR	LIVE
97	78628351	3274286	MAUI WOWI	TARR	LIVE
98	78618154	3149968	AQUA FORTE	TARR	LIVE
99	78600174	3076437	STONE HILL WINERY	TARR	LIVE
100	78600138	3076436	STONE HILL	TARR	LIVE

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[NEXT LIST](#)
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[\[SITE INDEX\]](#)
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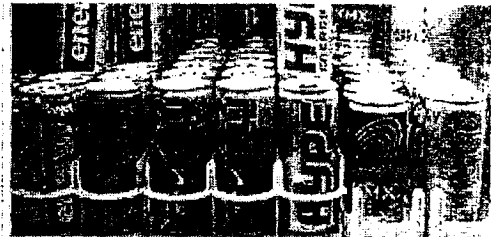
Energy drink

From Wikipedia, the free encyclopedia

Energy drinks are soft drinks advertised as providing energy to improve physical activity of the drinker, as compared to a typical drink. Rather than providing food energy (as measured in calories),^[1] these drinks are designed to increase a user's mental alertness and physical performance by the addition of caffeine, vitamins, and herbal supplements which may interact to provide a stimulant effect over and above that obtained from caffeine alone.^[2]

Contents

- 1 Ingredients
- 2 Desirable effects
- 3 Adverse effects
- 4 History
- 5 Combination with alcohol
- 6 See also
- 7 References
- 8 External links



A variety of energy drinks are available; the skinny "bullet" can shape is popular.



Energy drinks are also sold in larger cans and resealable bottles (Reload).

Ingredients

Generally energy drinks include methylxanthines (including caffeine), vitamin B and herbs. Other common ingredients are guarana, acai, and taurine, plus various forms of ginseng, maltodextrin, carbonated water, inositol, carnitine, creatine, glucuronolactone and ginkgo biloba. Some contain high levels of sugar, and many brands also offer artificially-sweetened 'diet' versions. The central ingredient in most energy drinks is caffeine, the same stimulant found in coffee or tea, often in the form of guarana or yerba mate.

The average 237 milliliter (8 fluid ounce) energy drink has about 80 mg of caffeine, with 480 mL (16 fl. oz.) drinks containing around 150 mg.

Desirable effects

A variety of physiological and psychological effects attributed to energy drinks and/or their ingredients have been investigated.

Two studies reported significant improvements in mental and cognitive performances as well as increased subjective alertness. Excess consumption of energy drinks may induce mild to moderate euphoria primarily caused by stimulant properties of caffeine and may also induce agitation, anxiety, irritability and insomnia.^[3] During repeated cycling tests in young healthy adults an energy drink significantly increased upper body muscle endurance.^[4] It was also suggested that reversal of caffeine withdrawal is a major component of the effects of caffeine on mood and performance.^[5]

Restorative properties were shown by a combination of caffeine and the sugar glucose in an energy drink,^[6] and some degree of synergy between the cognition-modulating effects of glucose and caffeine was also suggested.^[7] In one experiment, a glucose-based energy drink (containing caffeine, taurine and glucuronolactone) was given to eleven tired participants being tested in a driving simulator. Lane drifting and reaction times were measured for two hours post-treatment and showed significant improvement.^[8]

Two articles concluded that the improved information processing and other effects could not be explained in terms of the restoration of plasma caffeine levels to normal following caffeine withdrawal.^[9]

Adverse effects

Caution is warranted even for healthy adults who choose to consume energy beverages. Consumption of a single energy beverage will not lead to excessive caffeine intake; however, consumption of two or more beverages in a single day can.^{[10][11]} Other stimulants such as ginseng are often added to energy beverages and may enhance the effects of caffeine,^[12] and ingredients such as guarana themselves contain caffeine. Adverse effects associated with caffeine consumption in amounts greater than 400 mg include nervousness, irritability, sleeplessness, increased urination, abnormal heart rhythms (arrhythmia), and stomach upset.^{[10][11]} The concentration of sugar in a sports drink is recommended to be 6-7% carbohydrate to allow maximum absorption and minimize spikes and crashes in blood sugar. Higher concentrations such as those seen in energy drinks will slow fluid absorption into the blood and energy system, increasing the possibility of dehydration. When a high level of sugar is in the blood stream the body cannot get the water into the cells that it needs because the water is busy trying to dilute concentration of sugar in the blood stream. The actual number of people suffering from adverse effects is difficult to measure since many cases go unreported.^[13]

In the United States, energy drinks have been linked with reports of nausea, abnormal heart rhythms and emergency room visits.^[14] The drinks may cause seizures due to the "crash" following the energy high that occurs after consumption.^[15] Caffeine dosage is not required to be on the product label for food in the United States, unlike drugs, but some advocates are urging the FDA to change this practice.^[16]

Until 2008, France banned the popular energy drink Red Bull after the death of eighteen-year-old Irish athlete Ross Cooney, who died as a result of playing a basketball game after consuming four cans of the drink.^[17] The French Scientific Committee (J.D. Birkel) concluded that Red Bull has excessive amounts of caffeine.^[17] Denmark also banned Red Bull. Britain investigated the drink, but only issued a warning against its use by pregnant women and children.^[17]

History

Although not marketed as such, the Scottish drink Irn-Bru may be considered the first energy drink, produced as "Iron Brew" in 1901. In Japan, the energy drink dates at least as far back as the early 1960s, with the release of the Lipovitan. Most such products in Japan bear little resemblance to soft drinks, and are sold instead in small brown glass medicine bottles or cans styled to resemble such containers. These "genki drinks", which are also produced in South Korea, are marketed primarily to the salaryman set.

In UK, Lucozade Energy was originally introduced in 1929 as a hospital drink for "aiding the recovery;" in the early 1980s, it was promoted as an energy drink for "replenishing lost energy."

The first drink marketed as being designed to improve the performance of athletes and sports stars arrived in the sixties. It was invented for the football team at the University of Florida, known as the Gators — hence its name, Gatorade. Designed to aid hydration and lengthen performance levels, it claimed that its ingredients were formulated for just such things.

In 1985, Jolt Cola was introduced in the United States. Its marketing strategy centered on the drink's caffeine content, billing it as a means to promote wakefulness. The initial slogan was, "All the sugar and twice the caffeine."

In 1995, PepsiCo launched Josta, the first energy drink introduced by a major US beverage company (one that had interests outside just energy drinks).

In Europe, energy drinks were pioneered by the S. Spitz Company and a product named Power Horse, before the business savvy of Dietrich Mateschitz, an Austrian entrepreneur, ensured his Red Bull product became far better known, and a worldwide best seller. Mateschitz developed Red Bull based on the Thai drink Krating Daeng, itself based on Lipovitan. Red Bull is the dominant brand in the US after its introduction in 1997, with a market share of approximately 47%.^[18]

In New Zealand and Australia the current leading energy drinks product in those markets V (drink) was introduced by Frucor Beverages Frucor.

By the year 2001, the US energy drink market had grown to nearly 8 million per year in retail sales. Over the next 5 years, it grew an average of over 50% per year, totaling over \$3 billion in 2005.^[19] Diet energy drinks are growing at nearly twice that rate within the category, as are 16-ounce sized energy drinks. The energy drink market became a \$5.4 billion dollar market in 2007, and both Goldman Sachs and Mintel predict that it will hit \$10 billion by 2010. Major companies' such as Pepsi, Coca-Cola, Molson, and Labatt have tried to match smaller companies' innovative and different approach, with marginal success.

Energy drinks are typically attractive to young people. Approximately 65% percent of its drinkers are between the ages of 13 and 35 years old, with males being approximately 65% of the market.^[19] A 2008 statewide Patient Poll conducted by the Pennsylvania Medical Society's Institute for Good Medicine found that: 20 percent of respondents ages 21–30 had used energy drinks in high school or college to stay awake longer to study or write a paper; 70 percent of respondents knew someone who had used an energy drink to stay awake longer to study or work.^[20] Energy drinks are also popular as drink mixers.

In 2001 Coca-Cola marketed two Powerade brand energy drinks in bullet-shaped, screw-top aluminum bottle cans produced by Exal Corporation (<http://www.exal.com>) of Youngstown, Ohio. In 2002 CCL Container and Mystic Brands, Inc., part of the Snapple Beverage Group, worked together on the national launch of Mystic RE, which used a recyclable aluminum bottle. Since its introduction, many energy

drinks are now packaged in the aluminum bottles or bottlecans.

Capri Sun targeted 16-25 year-olds with its Island Refreshers line, graduating from a foil pouch design to a bottlecan or aluminum bottle. In the UK, Coca-Cola has marketed a direct Red Bull competitor, 'Sprite 3G', in a similar 250 mL can and has also launched 'Relentless', a juice-based energy drink in 500 mL cans.

UK supermarkets have launched their own brands of energy drinks at lower prices than the major ones. These are mostly produced by US beverage maker Cott. Tesco supermarkets sell 'Kick' in 250 mL cans and 1 L bottles, Sainsbury's sell 'Blue Bolt' in similar packaging, Asda sell 'Blue Charge' in similar packaging and Morrison's sell 'Source' in 250 mL cans. Cott sells a variety of other branded energy drinks to independent retailers in various containers.

Since 2002 there has been a growing trend for packaging energy drink in bigger cans. Since in many countries, including the US and Canada, there is a limitation on the maximum caffeine per serving in energy drinks, this allows manufacturers to include a greater amount of caffeine by including multiple servings per container. Popular brands such as Redbull and Monster have increased the amount of ounces per can. Conversely, the emergence of energy shots have gone the opposite way with much smaller packaging.

In 2007 energy drink powders and effervescent tablets were introduced, in the form of a tablet or powder that can be added to water to create an energy drink. These can offer a more portable option to cans and shots.

More recently, the industry has moved towards the use of natural stimulants and reduced sugar.

Combination with alcohol

Energy drinks are sometimes mixed with alcohol. Where energy drinks are stimulants, alcohol is a depressant. The mix can be particularly hazardous as energy drinks can mask the influence of alcohol and a person can fail to take its effects into consideration.^[13] Normally fatigue would set in as large amounts of alcohol are being consumed, but the stimulating effect of energy drinks can override this effect.^[21] Often drunk with vodka or in shots, it has led to an increase in the purchase of pre-mixed drinks also known as alco-pops often containing guarana or taurine extract which provides energy drinks with their flavor.

See also

- List of energy drinks

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Exhibit G

Alcohol, Energy Drinks, and Youth: A Dangerous Mix



Alcohol, Energy Drinks, and Youth: A Dangerous Mix

This report is authored by Michele Simon, of Marin Institute and James Mosher, of Pacific Institute for Research and Evaluation. The authors wish to acknowledge research assistance from Ellen Fried, Amanda Hill, Julie Murphy, Sue Thomas, and Allyson Hauck.

The Marin Institute fights to protect the public from the impact of the alcohol industry's negative practices. We monitor and expose the alcohol industry's harmful actions related to products, promotions and social influence, and support communities in their efforts to reject these damaging activities.

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Executive Summary

Public health and safety officials have become alarmed by the newest entry into the world of alcoholic beverages. Alcoholic energy drinks are prepackaged beverages that contain not only alcohol but also caffeine and other stimulants. Earlier this year, 29 state attorneys general signed a letter to Anheuser-Busch expressing their concern about Spykes, an alcoholic energy drink packaged in colorful 2-ounce bottles with obvious appeal to youth. The objections of law enforcement officials as well as parents and leading public health organizations caused Anheuser-Busch to pull Spykes from the market. But the story does not end there. Many other alcoholic energy drinks are still on the market.

Despite the sharp increase in sales of alcoholic energy drinks, their appeal to underage drinkers, and the health concerns involved in mixing stimulants with alcohol, research on the potential dangers of these products remains limited. This study reviews what data is available and takes an in-depth look at the alcohol industry's marketing practices promoting the consumption of alcoholic energy drinks. The results, while preliminary, are unsettling. Both scientists and policymakers should focus increased attention on this emerging product category.

Targeting Youth

To understand how alcoholic energy drinks are marketed, it is critical to examine the popularity of nonalcoholic energy drinks among youth. Teenagers and young adults are the core consumer group for these products. Thirty-one percent of 12- to 17-year-olds and 34 percent of 18- to 24-year-olds report regular consumption of energy drinks. Nonalcoholic energy drink producers promote youth consumption using "grassroots" level marketing strategies, as opposed to traditional channels (such as television, radio, magazine, and outdoor advertising). Companies are looking for "one-on-one relationships" gained through events, extreme sports sponsorships, Internet interactions, text messaging, and communication among users on Internet sites such as MySpace and Facebook.

Alcoholic energy drink producers have built on the popularity of nonalcoholic energy drinks in two ways: 1) promoting the mixing of energy drink products with alcohol, and 2) marketing premixed alcoholic energy drinks. Efforts to encourage the mixing of alcohol with energy drinks serve as a stepping stone to building a separate beverage category of premixed alcoholic energy drinks.

Miller Brewing Company and Anheuser-Busch, the two largest U.S. brewers, are the leading producers of this new alcoholic beverage category, with brands that include Sparks, Tilt, and Bud Extra. Their marketing tactics mirror those used for nonalcoholic energy drinks: "grassroots" consumer strategies; images and messages that promote their association with partying and other high energy activities; and containers that have sizes, shapes, and graphics similar to their nonalcoholic cousins. The similarities in containers create the potential for confusion among consumers, retailers, parents, law enforcement officers, and others regarding which products contain alcohol and which do not. Alcoholic energy drinks are also a cheap alternative to purchasing alcoholic beverages and energy drinks separately. Taken together, these strategies strongly suggest that alcohol companies are marketing alcoholic energy drinks to young people.

Health Concerns

Although there is debate regarding the overall risks and benefits of energy drink and moderate caffeine consumption, health researchers agree that caffeine consumption can have adverse health consequences, particularly at high doses. Among the most common negative effects are increased anxiety, panic attacks, increased blood pressure, increased gastric acid, bowel irritability, and insomnia.

With the rising popularity of energy drinks and with more young people ingesting high levels of caffeine, more serious health problems are now being reported in the nation's poison centers, while reports from other countries suggest potentially serious consequences from caffeine overdose.

Although the research community has not yet fully confronted the potential health risks associated with adding alcohol to energy drinks, the studies that have been done suggest serious cause for concern. Caffeine, a stimulant, masks the intoxicating effects of alcohol, which may lead to increased risk-taking. Young people are therefore particularly vulnerable to increased problems from ingesting these products, since they are more likely to take risks than adults and to suffer high rates of alcohol problems, including alcohol-related traffic accidents, violence, sexual assault, and suicide.

A Call to Action

The available research suggests that alcoholic energy drinks create a dangerous mix. Yet the alcohol industry markets the beverages with messages that fail to alert users to the potential for misjudging one's intoxication. Indeed, these messages irresponsibly suggest that the beverages will enhance alertness and energy.

Action is needed from both the alcohol industry and from governments at all levels. Alcoholic beverage producers should discontinue the production of alcoholic energy drinks pending further scientific study that demonstrates the products' safety, particularly for young people. The federal government should conduct investigations into the marketing of these products, conduct research to determine any link to both short- and long-term health problems, particularly among young people, and initiate a public information campaign to alert consumers, parents, and law enforcement to the risks associated with mixing alcohol and energy drinks. State and local governments should not wait for federal action and should initiate their own investigations, research, and public information campaigns.

Community groups, parents, law enforcement agencies, and citizens also need to take action, calling for industry marketing reforms and governmental action. The alcohol industry's marketing of alcoholic energy drinks should be vigorously opposed before the products become even more popular. To risk delaying action until further studies can be conducted is to experiment with the health of young people. Furthermore, past experience shows that a swift response is critical or the economic benefits associated with alcoholic energy drinks' sale will become entrenched, making regulation far more difficult.

Introduction

Alcoholic energy drinks—prepackaged beverages that contain alcohol, caffeine, and other stimulants—are the newest entries into the world of alcoholic beverages. Their introduction has alarmed public health and safety officials, as illustrated by the reaction to Spykes, a 12 percent alcoholic energy drink packaged in 2-ounce bottles that come in flavors such as “hot chocolate” and “spicy mango.” On May 10, 2007, 29 state attorneys general sent a letter to Anheuser-Busch, Spykes’s producer, which stated in part:

Given the documented health and safety risks of consuming alcohol in combination with caffeine or other stimulants, Anheuser-Busch’s decision to introduce and promote these alcoholic energy drinks is extremely troubling. Young people are heavy consumers of non-alcoholic energy drinks, and the manufacturers of those products explicitly target the teenage market. Promoting alcoholic beverages through the use of ingredients, packaging features, logos and marketing messages that mimic those of nonalcoholic refreshments overtly capitalizes on the youth marketing that already exists for drinks that may be legally purchased by underage consumers.¹

The uproar from not only a majority of states’ chief law enforcement officials but also parents and leading organizations and officials in public health, education, and nutrition led to Anheuser-Busch’s decision to pull Spykes from the market.² Yet, despite this concession, the alcohol industry, including Anheuser-Busch, has introduced numerous other alcoholic energy drinks, is using the very marketing tactics criticized by the attorneys general, and views these drinks as having great market-growth potential. This report asks the following questions:

- How are these products marketed?
- How are they connected to nonalcoholic energy drinks?
- Does combining alcohol with caffeine and other stimulants create risks beyond those associated with alcohol consumption alone?
- Do these products create particular risks for young people?
- If the concerns being raised are justified, what should be done?

Remarkably, only limited research is available to guide us, despite the explosion in sales of nonalcoholic energy drinks and the health concerns of mixing drinks with alcohol. We have reviewed what research is available and conducted an in-depth examination of the alcohol industry’s marketing practices promoting the consumption of alcoholic energy drinks.

The report is divided into five sections: (1) the emergence of the nonalcoholic energy drink market, (2) the introduction and marketing of alcoholic energy drinks, (3) research on the health and safety risks of alcoholic energy drinks, (4) governmental responses to health and safety concerns, and (5) recommendations for action. Our goal is to provide enough information for an informed debate and the development of public policies to protect the public’s health, particularly America’s youth, who may face heightened risks of harm from these beverages.

Energy Drinks

Rapidly Expanding Market

The story of alcoholic energy drinks begins with the introduction and rapidly developing popularity of nonalcoholic energy drinks in the marketplace. High-caffeine soft drinks have existed in the United States since at least the 1980s beginning with Jolt Cola. Energy drinks, which have caffeine as their primary “energy” component, began being marketed as a separate beverage category in the United States in 1997 with the introduction of the Austrian import Red Bull.³ Energy drink consumption and sales have exploded since then, with more than \$3.2 billion in sales in 2006, a 516 percent inflation-adjusted increase since 2001.⁴

This explosion has encouraged a proliferation of new brands: as many as 500 new energy drink products were introduced worldwide in 2006.⁵ Yet the market in the United States is dominated by five producers, which account for 93.8 percent of sales.⁶ Although Red Bull’s share has been slipping, it still is by far the largest manufacturer, with 42.7 percent of the market, followed by Hansen Natural Corporation (Monster brands—16 percent), PepsiCo (SoBe and Amp brands—13.2 percent), Rockstar International (12.1 percent), and Coca-Cola (Full Throttle and Tab brands—9.8 percent). Mintel International Group, a leading marketing research firm, anticipates continued,

although less dramatic, growth of 84 percent in sales by 2011.⁷ It also predicts rapid consolidation of the industry. This market growth has largely come at the expense of soft drinks, and soft drink manufacturers such as Coca-Cola and Pepsi have responded by aggressively entering the market, developing new hybrid soda/energy drinks, shifting marketing strategies, and distributing and then buying up new brands.⁸

Teens: Driving the Market for Nonalcoholic Energy Drinks

Teenagers and young adults are undoubtedly the core consumer group for energy drinks. This reality is a cause for concern, given the recent emergence of alcoholic energy drinks and the similarity in the packaging between the two categories. There is a paucity of epidemiological studies assessing the demographics of energy drink consumers, but data are available from market surveys. Mintel International Group has conducted the most comprehensive study, relying on Simmons Teen Survey data (a comprehensive analysis of teen purchasing behavior).⁹ Thirty-one percent of 12- to 17-year-olds and 34 percent of 18- to 24-year-olds report regular consumption of energy drinks, compared with 22 percent of 25- to 34-year-olds, with rates decreasing rapidly with age. Only 3 percent of seniors 65 years of age and older report any consumption.

Consumption begins at very early ages: 28 percent of 12- to 14-year-olds report regular consumption of energy drinks. Teen consumption has grown rapidly since 2002. For 12- to 17-year-olds, rates increased from 18 percent in 2002 to 31 percent in 2006.

Marketing Strategies Promote Youth Consumption

Given the increasing concerns over alcoholic energy drinks, it is critical to understand how the nonalcoholic counterparts are marketed. Of course, it is legal for children to purchase energy drinks, but as discussed in the next section, alcohol companies appear to be mimicking the marketing strategies for nonalcoholic energy drinks, thereby capitalizing on the popularity of nonalcoholic energy drinks among youth.

With such a young core consumer base, energy drink marketing focuses on youth themes and strategies. Mintel International Group attributes the popularity of such themes and strategies to their association with teenagers' drive for rebellion, risk taking, and adventure seeking. Marketers use dramatic product names (e.g., Cocaine, DareDevil, Bawls, Pimp Juice, Rip It, and Monster Assault), edgy graphics on containers, and sponsorships of extreme sporting events and lifestyles, such as wakeboarding, skateboarding, motocross, and surfing.¹⁰

Manufacturers support the marketing messages and themes with higher concentrations of caffeine, increasing the "jolt" or stimulant effect of the products. Many energy drinks contain substantially higher levels of caffeine than do servings of coffee. Youth appeal is further supported through the easy access of energy drinks at convenience stores, an important venue for teen purchasing.

The marketing strategies are communicated at a "grass-roots" level, as opposed to traditional channels (such as television, radio, magazine, and outdoor advertising), because companies are looking for "one-on-one relationships" gained through events, extreme sports sponsorships, Internet interactions, text messaging, and communication among users on Internet sites such as MySpace and Facebook. For example, the Monster brand's "ambassadors" give away free samples at sporting events, concerts, and other teen venues. Red Bull owns teams such as the New York Red Bulls soccer team and plans to start its own NASCAR team.

Mintel reports that these nontraditional forms of marketing are critical to energy drink promotions, highlighting, in particular, consumer interactions on the Internet:

The most current trend in energy drinks marketing is from its users in cyberspace. Users of most brands have created their myspace.com pages where users are shown drinking energy drinks. For example, on www.myspace.com/drinkcocaine, there are many pictures of teens drinking Cocaine energy drink. This kind of exposure is a boon to marketers, because users are in effect advertising the products for free. Moreover, it adds street credibility and reflects strong grassroots support.¹¹

Enter the Alcohol Industry

Mixing Alcohol and Red Bull in Bars

Premixed alcoholic energy drinks have their roots in bars and nightclubs, where bartenders began mixing Red Bull with vodka and other distilled spirits, a common practice in Europe before it took hold here. Both alcohol and energy drink companies encourage this practice. Although Red Bull denies it, the company's marketing practices suggest otherwise. Red Bull's director of communications stated in 2001 that Red Bull is perfect for nightclubs and bars. "People at nightclubs don't want to be there for 20 minutes; they want to stay all night to socialize and dance. Red Bull gives them energy to do that," he explained.¹² Red Bull encourages alcohol mixers with logo stickers, menus, cross-promotions, and contests with trips and prizes for bartenders and cocktail servers. A bar owner in Manhattan has attributed improved Red Bull sales to these and similar promotions. He says: "The young, American downtown crowd has started to drink it and I can easily charge \$10 for a vodka and Red Bull."¹³ The company also states that it is unconcerned about any potential harm.¹⁴

SoBe's nonalcoholic Adrenaline Rush is billed as a "maximum energy supplement" with the tagline "Get it Up, Keep it Up," a message geared toward young consumers. Recognizing the trend toward mixing energy drinks with alcohol in bars, the company is planning promotions with Adrenaline "nurses" in nightclubs. John Bello, CEO of the former South Beach Beverage Company (since acquired by PepsiCo), which is the producer of Adrenaline Rush, states: "Young people want to get a buzz and stay up all night. We make no pretense that this is a health drink. This is the party market."¹⁵

Alcohol companies have adopted the same strategy for their traditional alcohol products, encouraging consumers to mix them with energy drinks. For example, the Diageo product Captain Morgan Tattoo (black, spiced rum) has only one recipe on its website, for "Ink Drop," which is to mix 1.5 ounces of rum with 3 ounces of energy drink, and "serve straight."¹⁶

Anheuser-Busch has been the leading promoter of energy drink mixing among alcohol companies. The world's largest brewer entered the nonalcoholic energy drink market in

2006 with a product called 180, which refers to how drinkers will experience a 180-degree turnaround or lift in their energy levels. From the beginning, the combination with alcohol has been key to product success. One of Anheuser-Busch's wholesalers has posted recipes for combining 180 with rum, vodka, tequila, and other alcoholic products, and the company is promoting combining the energy drink with its new product Jekyll & Hyde, a distilled spirit.¹⁷ Anheuser-Busch distributes 180 through its extensive distribution network, in particular, trendy high-end bars and restaurants, along with convenience stores, the latter with extensive point-of-sale items. In doing so, Anheuser-Busch promotes the connection between energy drinks and alcohol. Anheuser-Busch's vice president explains that with 180 the company is capitalizing on the energy drink trend, "with usage occasions spread throughout the day, from morning 'pick me-ups' to nightclubbing."¹⁸

In February 2007, Anheuser-Busch increased its ties with nonalcoholic energy drinks when it announced a deal with Monster's manufacturer, Hansen Natural. Anheuser-Busch will manage the sales, distribution, and merchandising of Monster Energy drinks at bars, restaurants, and nightclubs. (The company had already been distributing Hansen drinks in grocery and convenience stores.) Most of the 600 independent distributors that work with Anheuser-Busch nationwide will have the choice to distribute Monster Energy to what's known as "on-premise" locations. This will enhance Hansen's ability to compete with Red Bull in bars, which accounts for 13 percent of energy drink sales.¹⁹

Introduction of Premixed Energy Drinks

The efforts to encourage the mixing of alcohol with energy drinks serve as a stepping stone to building a separate beverage category of premixed alcoholic energy drinks. According to Mintel:

Growth in the popularity of energy drinks can be attributed to bars and clubs, where energy drinks have been used as mixers. Now consumers can find pre-mixed alcoholic energy drinks at a nearby convenience store or grocery store. Alcoholic beverage (especially beer) manufacturers are increasingly launching products that are likely to appeal to young adults aged 21-24 who are most likely to drink beer and distilled spirits—ideal alcoholic drinks to mix with energy drinks.²⁰

Another article makes a similar point: "Manufacturers of the new alcoholic drinks are hoping to mirror the success of the nonalcoholic energy drinks, which have challenged traditional soft drinks."²¹ Sales of carbonated soft drinks have been falling in the United States, sending manufacturers scrambling for alternative products. Alcoholic beverage makers are seizing an opportunity to capitalize on the increasing popularity of energy drinks.

The trend began in 2000 with the introduction of Agwa (distilled from coca leaves), which was billed as the "world's first alcoholic energy drink." From the start, Agwa's marketing promoted its druglike effects, suggesting that it increased sexual prowess and earning the nickname "Vi-Agwa." The drink's marketing strategist was quoted: "We cannot bottle cocaine. But certainly people who have tried it have enjoyed amazing effects with it."²² (The product's website attempts to dispel "rumors" that the drink contains cocaine.)

Hansen Natural introduced the product Hard E also in 2000. Although it was discontinued in 2004,²³ the marketing strategy is revealing for the category. By 2000, Hansen had already established itself as a serious competitor to Red Bull with its Monster line of energy drinks. Hard E was a neon yellow drink that started with a beer base and mixed in vodka, flavorings, and "ingredients similar to Hansen's Energy drink," including ginseng and vitamins.²⁴ One trade article describes how the Hard E product launch was aimed at Generation Xers and the "20-something crowd," with taglines such as "party Hard E" and creating "a new kind of buzz." Ray LaRue, vice president of sales at Hansen, said research told the company that college students were already buying their energy drinks at convenience stores, purchasing the vodka separately, and then mixing the two in a flask for use on the dance floor. "To promote Hard E, LaRue said that Hansen has been designing marketing promotions in nightclubs in large cities, such as Excalibur in Chicago, and at legal raves, all-night parties in empty warehouses that are popular with kids today."²⁵

These two brands started a trend that has picked up momentum in the last six years, with numerous small producers introducing new products. In a sign that the industry sees the category as having potential, Miller and Anheuser-Busch, the two largest U.S. brewers, have entered the market. Miller purchased Sparks in 2006 for \$215 million. Sparks, the leading alcoholic energy drink on the market, was created by McKenzie River Partners in 2002, a start-up firm known for controversial, aggressive marketing.²⁶

Anheuser-Busch introduced three malt-based energy drinks—Tilt, B to the E (now called Bud Extra), and Spykes. (As mentioned earlier, the company withdrew Spykes in May 2007 under public pressure.)

Anheuser-Busch describes Tilt as being for "contemporary adults [who] are looking for innovative beverages that fit into their fast-paced, highly social lifestyles. Tilt was developed with this in mind because it is suited to a variety of drinking occasions."²⁷ While the original alcohol content was 6 percent, more recently, Anheuser-Busch announced a new Tilt variety that contains 8 percent alcohol, predicting that the product would be "a strong competitor" in the category.²⁸

Targeting Young People with a Cheap Alternative to Mixed Drinks

Producers of alcoholic energy drinks are using several tactics to promote their brands, many of which mirror the marketing of nonalcoholic energy drinks. The first tactic involves price: premixed alcoholic energy drinks provide a cheap alternative to purchasing the two types of beverages separately. (Youth are particularly sensitive to price.) In fact, in at least some convenience stores in California, alcoholic energy drinks are cheaper than nonalcoholic energy drinks.

Price Comparison—Three alcoholic brands cost about 25 percent less than three nonalcoholic brands.²⁹

Alcoholic Brands

■ Rockstar 21	\$1.59
■ Sparks	\$1.53
■ Tilt	\$1.53

Nonalcoholic Brands

■ Rockstar Juiced	\$2.03
■ Lost Energy	\$2.07
■ SoBe Adrenaline Rush	\$2.03

One analysis (or "review") of Sparks described it as a direct competitor to drinks that mix Red Bull and vodka:

Pitched as an alternative to 'so last year' Red Bull-and-vodka combinations, a fresh drink on the market proposes to be the top choice to get your alcohol fix with a zap of energy. Launched in 8 oz. steel cans, Sparks is quickly gaining a reputation amongst partygoers and trendsetters as the newest addition to the energy-drink market. The 6% alcohol content doesn't deter the

mainstream crowd; shaped like a battery, the vibrant orange and metal silver cans are almost toy-like in composition.³⁰

The *Phoenix*, a Boston entertainment newspaper, described the advantages of Sparks's cheap price compared with the cost of Red Bull and vodka, despite the bad taste:

But people aren't knocking back Sparks for its flavor. It tastes like carbonated cough syrup, sickly sweet, with a wince-inducing, orange-lemon flavor that takes a few sips to stomach. But at \$1.50 per 16-ounce can, about 60 cents cheaper than an 8.3-ounce can of Red Bull, it packs the triple-buzz punch of alcohol, taurine, and caffeine for a much lower price than a Red Bull and vodka—which can cost anywhere between four and eight bucks, depending on the bar.³¹

Another sign that the premixed alcoholic energy drink category is targeted to young people as a low-cost alternative to Red Bull and vodka comes from an article about the development of a product called Catalyst, just released in 2006. The product was created by two graduates of the University of California, Santa Barbara, who right after leaving school started experimenting with combining alcohol with ingredients such as caffeine, taurine, and L-carnitine. At first they added vodka because they had combined alcohol with energy drinks, like Red Bull and vodka while they were still in college. Vodka was soon discounted as an ingredient option because it was too expensive; the inventors wanted college students to be able to purchase the drink for a low cost. After months of experimentation, the ingredients for Catalyst were refined into a malt liquor and energy formula. After finalizing the ingredients for Catalyst, the formula was then sent to a taste company to change the drink's flavor.³²

Creating Brand Confusion with Nonalcoholic Energy Drinks

Alcohol producers promote the close association of their products with energy drinks by mimicking their containers, including size, shape, and graphics. These similarities create the potential for confusion among consumers, retailers, parents, law enforcement officers, and others regarding which products contain alcohol and which do not.

One product that stands out in this respect is Rockstar. There are several versions of the nonalcoholic variety, including Rockstar Original, Sugar-Free Rockstar,

Rockstar Zero Carb, Rockstar Juiced Plus Guava, and Rockstar Juiced Plus Juice. The drink's tagline is "Party Like a Rock Star." The alcoholic version is called Rockstar 21, and lining up the cans it is nearly impossible to tell them apart. Rockstar is the No. 3 brand of nonalcoholic energy drinks, doubling its sales from 2004 to 2006. Coca-Cola started distributing nonalcoholic Rockstar products in 2005; sales grew from \$1 million in 2001 to \$77 million in 2006. The potential for confusion is particularly troubling when one considers that nonalcoholic Rockstar drinkers (both male and female) are reportedly more likely to enjoy taking risks and to drive faster than normal.³³

In addition, marketing messages used for alcoholic energy drinks frequently mirror those used by their nonalcoholic cousins: images of rocket ships and exploding nuclear reactors; images and slogans referencing risk taking, sports, and all-night partying. Explicit sexual imagery or messages are often included, suggesting that the products can lead to sexual success for males, particularly in party situations. The messages are communicated primarily through the same channels used by energy drink marketers, with emphasis on nontraditional media: Internet sites, chat rooms, sporting event sponsorships, and the like. Consumer-to-consumer communication on Internet sites such as MySpace often involving underage drinkers is also occurring.

Moreover, in the first five months of 2007, the Kentucky Office of Alcoholic Beverage Control cited 25 clerks for selling alcoholic energy drinks to minors in that state. In the news account, the agency said the situation was especially troublesome because the drinks often contain higher alcoholic content than most other malt beverages. "This new line of alcoholic beverage product is extremely similar in look and feel to the popular energy drinks that contain no alcohol," said Chris Lilly, executive director of the Office of Alcoholic Beverage Control. "Our youth are at risk when clerks and retailers cannot differentiate between non-alcoholic and alcoholic beverages being sold."³⁴

In Utah, health advocates are concerned enough about the confusion that they are expected to lobby Utah lawmakers for a change in the labeling law to prevent mistaken sales to minors.³⁵ A bill to require special labels on alcoholic beverage containers that may be confused with nonalcoholic beverages is now being considered by the California legislature.³⁶

As this analysis suggests, alcoholic energy drinks are closely linked through their branding, ingredients, containers, and marketing tactics to their nonalcoholic cousins. With energy drink sales expanding rapidly, and with the entry into the market of Anheuser-Busch and Miller Brewing Company, both of which have extensive marketing resources and capacity, growth of both segments of the market is likely. This raises troubling questions, given the dramatic rise in popularity of nonalcoholic energy drinks with children as young as age 12 and the potential risks associated with mixing alcohol and caffeine, the topic of the next section.

Alcoholic Energy Drinks and Health: What Are The Risks?

Energy drinks, and now alcoholic energy drinks, constitute a new market phenomenon, viewed by producers and marketers as having great potential for increasing sales and profits. But what are the potential risks of drinking beverages with high levels of caffeine, other stimulants, and sweeteners, particularly to youth? And what added risks are associated with the combination of alcohol and caffeine? Unfortunately, public health researchers have largely ignored these questions. In fact, researchers have given more attention to the potential health benefits of energy drinks than to their potential for harm. This section provides an overview of the research that is currently available.

Do Energy Drinks Improve Performance and Health?

The starting point for assessing the health implications of alcoholic energy drinks is a review of research regarding the risks and benefits of energy drinks themselves. Alcohol companies are benefiting from the widely held belief that energy drinks do in fact improve energy, mental alertness, and physical fitness. Producers of energy drinks rely on and promote these health and fitness perceptions as an integral part of their marketing message. Red Bull, for example, describes its product as a "functional beverage" that increases endurance, concentration, and reaction speed and "vitalizes the body and mind."⁴⁴ According to its website, top athletes, students, taxicab drivers, and drivers on long journeys are among its users—people who, because of their physical demands, are more likely to appreciate these attributes.⁴⁵

Survey data from Mintel show that these claims are effectively reaching consumers. Seventy-six percent of users do so for an energy boost, while 35 percent report alertness as a motivator. Another 21 percent report hydration as a reason they consume energy drinks (apparently unaware of the diuretic effects of caffeine), while another 18 percent report health and nutrition as a motivator.

Red Bull and other energy drink companies attribute these positive characteristics to the interaction of multiple additives, including caffeine, guarana, taurine, ginseng, ginkgo, and glucuronolactone. Their stimulant/energy effects, however, come primarily from caffeine, the most

widely used mood-altering drug in the United States. Other additives are minor contributors in terms of the immediate effects felt by users.⁴⁶

Red Bull contains about the same amount of caffeine as a cup of coffee, but twice as much as a can of Coca-Cola, despite having about 40 percent less liquid per serving than Coke. Many energy drinks have significantly higher levels of caffeine. Because energy drinks are usually consumed as a cold beverage similar to soft drinks and packaged for rapid consumption, the body experiences a rapid increase or rush in caffeine's effects that is more pronounced than with coffee, which is usually served as a hot beverage and consumed more slowly.

Caffeine is popularly viewed as a relatively benign drug. Indeed, numerous scientific research studies report that the consumption of caffeine in general, and energy drinks in particular, results in some improvements in human mental and physical performance, including enhanced memory, reaction time, strength, and endurance.⁴⁷ Some studies have found enhanced performance associated with the ingestion specifically of Red Bull energy drink and have speculated that the results may be attributable not just to the caffeine but to the interaction of the drink's ingredients.⁴⁸

The studies cited above have been criticized on methodological grounds: they fail to account for caffeine withdrawal symptoms.⁴⁹ In other words, the studies are comparing individuals who are experiencing withdrawal symptoms with those who are not. Studies of caffeine consumption among nonusers and intermittent users who are likely not subject to withdrawal symptoms have found modest positive mood effects as well as some negative effects, although the reactions to the drug vary with each individual. One set of researchers summed up the research on caffeine's beneficial effects as follows:

The caffeine-induced improvements in performance and mood often perceived by consumers do not represent net benefits, but rather reversal of the performance-degrading effects of caffeine withdrawal. It appears from a minority of low/non-consumer and long-term abstinence studies that there may be some modest improvement in mood, and perhaps performance, as an acute effect of caffeine when ingested in the absence of withdrawal. However, these effects are small and inconsequential compared with the effects attributable to withdrawal reversal.⁵⁰

Negative Health Impacts of Caffeine and Energy Drinks

Although there is debate regarding the benefits of energy drink and caffeine consumption, there is consensus among health researchers that caffeine consumption can have adverse health consequences, particularly at high doses. Among the most common negative effects are increased anxiety, panic attacks, increased blood pressure, increased gastric acid, bowel irritability, and insomnia. According to an article published by the American Society of Addiction Medicine, caffeine is considered an addictive drug under standard drug diagnosis criteria, and doses of 500 mg or more (four to eight servings of most energy drink brands) can result in caffeine intoxication.⁵¹ Dependent users report an inability to quit or to cut down their consumption, despite having medical or psychological problems made worse by caffeine, and they report continued use of caffeine to avoid experiencing caffeine withdrawal symptoms. Contrary to popular belief and industry marketing claims, caffeine does not enhance sports performance and can have a negative impact at high doses because of its diuretic effects.⁵²

With the rising popularity of energy drinks and with more young people ingesting high levels of caffeine, more serious health problems are now being reported in the nation's poison centers. One three-year study by a Chicago poison center found more than 250 cases of caffeine overdose, with 12 percent of those requiring hospitalization. Nearly two-thirds of the hospitalizations involved the intensive care unit.⁵³ Symptoms included insomnia, palpitations, tremors, sweating, nausea, vomiting, diarrhea, chest pains, and neurological symptoms. The average age of patients was 21.

Another poison center study focused on Redline, a high-potency nonalcoholic energy drink containing 250 mg of caffeine per serving. Nine cases requiring hospitalization related to this specific drink were reported in the California Poison Control System Database in a two-year period, with severe symptoms involved.⁵⁴

Recently, a nonalcoholic energy drink called Spike Shooter, containing 300 mg of caffeine per serving, caused an uproar in Colorado Springs. In just one week, 18 high school students there reported becoming sick after drinking this product. The principal of the high school became so alarmed that she banned the drink on campus and convinced the nearby convenience store to stop selling it.

The product's label warns that those under 18 and anyone with health concerns should not use it. According to the news account:

Despite the warning, 14-year-old Rachel Woodrow, a diabetic, drank one can and started shaking. Two days later, she was hospitalized for a seizure. Rachel's parents say doctors told them the drink increased her metabolism and may have triggered the seizure. Rachel admits she didn't read the label. Rachel says, "I thought it would make me feel hyper and everything, but I didn't think I would have a seizure." Another student wanted to "get a little hyper" by drinking "spike shooter." Instead, Chris Weir says, "My stomach started to cramp up. I had a headache and I started vomiting."⁵⁵

Systematic studies assessing the impact of caffeine overdose do not yet exist, although anecdotal reports from other countries suggest potentially serious consequences. In 2000, an 18-year-old Irish student died after sharing four cans of Red Bull with friends and then playing basketball. In 2001, Swedish officials investigated the deaths of three young people who had been drinking Red Bull; two of them had mixed the product with alcohol.⁵⁶ Ultimately, no clear connections in the deaths were made and the Swedish government simply recommended that energy drinks not be used to quench thirst or be combined with alcohol. Other countries have followed Sweden's lead and put restrictions on the availability of energy drinks. Norway has limited sales to drug stores, and France and Denmark have banned the drinks altogether.⁵⁷

In summary, although research is limited, we can conclude that people who consume caffeine experience similar (although less severe) effects on the body—addiction, withdrawal, and tolerance—as do consumers of other psychoactive drugs. Potentially serious health consequences occur when the drugs are consumed in high doses, and these occurrences are being reported more frequently by health providers as high-potency energy drinks become more available in the market. Yet, despite these health concerns, the primary focus of most research literature on caffeine and energy drinks is on whether the beverages enhance performance, with recent research questioning the industry's marketing claims. Largely ignored are the health implications of sustained consumption of high levels of caffeine, particularly among youth, and the impact of combining energy drinks with alcohol.

Research on the Health Effects of Other Energy Drink Additives

Energy drink manufacturers also make marketing claims (or rely on the claims of others) that ingredients besides caffeine (e.g., taurine, ginkgo, ginseng, and guarana) enhance energy drinks' positive effects, including improved mental alertness and physical performance. According to Mintel, one in three surveyed said they drink nonalcoholic energy drinks for ingredients other than caffeine, noting that "most of these ingredients consist of herbs such as guarana and taurine, which create a mysterious aura that intrigues some energy drink users."⁵⁸

These marketing claims are not supported in the research literature. For example, taurine supplements may have modest beneficial health impacts in some carefully defined situations, depending on individual health conditions and dosage.⁵⁹ Energy drinks are a poor vehicle for gaining these possible benefits because dosage levels (which are often not disclosed) vary widely across beverages, their possible impacts depend on individual characteristics of users, and safe upper dosage limits have not been established.⁶⁰

Similarly, ginkgo and ginseng are popular among many alternative health providers and advocates for their potential to improve long-term health. Research has not confirmed any long- or short-term health benefits of these supplements, and providing unspecified dosages of them in energy drinks is unlikely to have any immediate effect on mental or physical performance.⁶¹ Guarana is a powerful herbal stimulant that enhances the stimulating effects of caffeine. Research does not suggest any mental or physical effects beyond those attributable to caffeine.⁶²

In summary, despite manufacturers' claims, there is no scientific basis for concluding that the noncaffeine additives in energy drinks contribute to either long-term health benefits or short-term mental alertness and physical performance. They may create health risks, particularly since dosage levels are often not disclosed. As suggested by Mintel, these ingredients appear to be included mainly for marketing purposes.

Health Implications of Adding Alcohol to Energy Drinks

Energy drinks clearly have potential negative health consequences, and marketing claims regarding their benefits have limited support in the research literature. What health and safety implications exist for adding alcohol to the mix?

Alcohol is a leading cause of death and injury, from driving under the influence of alcohol to violence, sexual assault, and suicide, and contributes to family and community disruption, poor school performance, and other psychological and sociological dysfunctions. These problems are particularly acute for young people. Does mixing alcohol with energy drinks create more risks than alcohol alone?

While the health research literature here is limited, the studies that do exist suggest cause for concern. At least four studies on humans have examined the interaction of some energy drink additives with alcohol. In one study,⁶³ researchers gave 15 subjects either doses of caffeine and alcohol or alcohol alone and then tested them on a variety of performance measures. Subjects who ingested caffeine reported reduced depressant effects of alcohol, but showed only limited improvement in motor skills over the other subjects.

The remaining three studies, using similar designs, found no such improvements. The second found that energy drinks did not reduce alcohol's deleterious impact on heart rate, oxygen uptake, and other physiological variables during strenuous exercise. The third found that while energy drinks did reduce some subjects' perception of alcohol intoxication, motor coordination, and visual reaction tests, they had no impact on alcohol's negative effects. The subjects' performance was significantly worse after ingesting the alcohol-energy drink mix despite the volunteers' perception of increased alertness and reduced intoxication.⁶⁴

The fourth study also concluded that caffeine does not counteract alcohol's effect, but went a step further, assessing the importance of consumers' expectancies.⁶⁵ Those who were not aware of the caffeine in the beverage compensated to some degree for alcohol's intoxicating effects, while those who were aware of the presence of caffeine did not. In other words, the belief that caffeine will counteract the alcohol may undermine the capacity to compensate for one's intoxication.

These findings support a truism among alcoholism recovery and prevention specialists that drinking coffee does not in itself counteract intoxication but rather results in a "wide-awake drunk." Public health and alcohol treatment experts generally advise against mixing energy drinks and alcohol, because, as suggested by research that is available, the combination may lead intoxicated persons to conclude mistakenly that they are capable of potentially dangerous activities,

such as driving. These risks may be particularly acute for young people, who are inexperienced and more likely to engage in risk-taking behavior.

The available research focuses on short-term intoxicating effects. Alcohol is also associated with a wide array of negative long-term consequences, including alcoholism and alcohol abuse, liver damage, cancer, and birth defects. It can also adversely affect brain development among teenagers and young adults.⁶⁶ Does routine consumption of high doses of caffeine exacerbate these problems? The research literature has thus far failed to investigate the potential physiological risks of combining caffeine and alcohol, a stimulant and a depressant, over time. Likewise, there is no literature on the triple combination of alcohol, caffeine, and sweeteners, all of which have the potential for leading to addiction.⁶⁷

Conclusion: Combining Alcohol and Caffeine Is Potentially Harmful

As the available research suggests, alcoholic energy drinks create a dangerous mix. Yet the alcohol industry markets the beverages with messages that fail to alert users to the potential for misjudging one's intoxication and, instead, suggest that the beverages will enhance alertness and energy. The industry promotes their use precisely in circumstances that may lead to alcohol-related harm: in social situations that may involve driving, as an enhancement to sexual encounters, and in late-night partying environments that may result in violence. At least one industry executive is aware of the misleading marketing messages. According to Mark Hall, sales executive for Hansen, discussing its alcoholic energy drink Hard E: "The effect is a heightened level of awareness. You will get intoxicated at the same rate as with any other alcoholic beverage. The difference is that you will seem more alert and more awake."⁶⁸

Governmental Responses to Public Health Concerns

What government oversight exists to address these potential risks to public health and safety and potentially misleading and unfair marketing practices? The short answer is: very little.

Federal law prohibits labeling and advertising of malt beverages that is "false or, irrespective of falsity, or by ambiguity, omission, or inference, or by the addition of irrelevant ... matter tends to create a misleading impression."⁶⁹ In addition, health statements that "imply that a physical or psychological sensation results" from consuming an alcoholic

energy drink may be prohibited or may require a specific disclaimer or qualifying statement to ensure that they are not misleading.⁷⁰

The U.S. Tax and Trade Bureau (TTB), the agency primarily responsible for enforcing these provisions, issued an "announcement" in May 2005 alerting producers of alcoholic energy drinks to these provisions, stating:

It is TTB's policy that the use of advertising statements that imply that consumption of certain alcohol beverages will have a stimulating or energizing effect, or will enable consumers to drink more of a product without feeling the effects of the alcohol, are misleading health-related statements that are in violation of [federal law]. ... TTB will take appropriate enforcement action when we determine that there have been violations of the advertising provisions of the FAA Act or its implementing regulations.⁷¹

Yet, marketers have continued to use messages that clearly imply, and in many cases explicitly state, that the products will be stimulating and energizing.

Anheuser-Busch: Party All Night Marketing

Tilt — The Tilt web site contains several messages that convey a "party all night" theme.⁷²

Use Tilt when you:

- Gear up for a night to impress
- Move from party to after-party
- Get your 2nd wind
- Get your 3rd, 4th, and 5th wind
- Get amped up about the evening's possibilities

Bud Extra — The Bud Extra web site uses numerous marketing messages to promote the product as a good means to partying all night.⁷³

- Who's up for staying out all night?
- That's you all right. Relaxed and Ready to Roll
- It's not about the close down
- There's no such thing as too late
- Fun doesn't punch the clock
- Stay around for every twist of the ride
- Say hello to an endless night of fun
- The weekend is a state of mind

Bud Extra's advertising slogans use similar late-night partying themes:

- You Can Go Home Early When You're Married
- You Can Sleep When You're 30
- Go Home With More Than a Burrito Tonight

To date, TTB has not announced a single investigation or alleged a violation of these federal provisions. Nor has there been any action by the Federal Trade Commission or the Food and Drug Administration or any other federal or state agency with potential jurisdiction over false, misleading, or unfair advertising. Also ignored by federal agencies are the marketing tactics that associate the products with nonalcoholic energy drinks, and the implications of this association for underage drinking. Only a committee of state attorneys general has undertaken any investigation, as noted in the introduction, and their intervention with Anheuser-Busch contributed to the company's decision to withdraw Spykes, an alcoholic energy drink that is 12 percent alcohol.

A second regulatory issue involves the classification of alcoholic energy drinks as malt beverages. The malt beverage designation has important marketing advantages, including much lower state and federal taxes and expanded availability in retail outlets that can sell beer and not spirits. Many of these outlets, such as convenience stores, tend to be frequented by youth.

In recent years, controversy has increased over this classification because of the industry's production process and concern over youth consumption. According to a federal study, most malt-based "alcopops" (such as Smirnoff Ice and Mike's Hard Lemonade) start out as beer, but then companies remove beer characteristics, including taste and color, adding distilled spirits and other additives. The final product has little if any similarity to beer.⁷⁴ Although the federal government has not investigated the issue, alcoholic energy drinks appear to be produced in the same manner, since they are labeled as malt beverages but do not have any beer characteristics.

The TTB has determined that the products can maintain the malt beverage classification if their total alcohol content is 6 percent or less and if no more than 49 percent of their alcohol content comes from distilled spirits flavoring.⁷⁵ (Some energy drinks, such as Sparks Plus and Tilt do contain more than 6 percent alcohol, indicating potential violation of the federal rule, which is even stricter for beverages over the 6 percent threshold.)

In addition to federal law, each state has its own classification schemes for alcohol products. Most state laws (at least 29 as of 2003) do not permit the addition of distilled spirits

to beer, and where this is the case, most malt-based energy drinks are likely misclassified.⁷⁶ In other words, alcoholic energy drinks in these states probably should be taxed at a much higher rate and be made available only in stores that sell distilled spirits. The TTB and relevant state agencies have taken no action to investigate this classification issue.⁷⁷ Doing so could result in significantly higher prices for these products, potentially resulting in a decrease in youth consumption, since young people are particularly sensitive to price.

Another area of inadequate government oversight is labeling. Because nonalcoholic energy drinks are regulated by the FDA as a food or beverage, labels on these products are required to contain a listing of all ingredients, in addition to "nutrition facts." Alcoholic products, however, are regulated by the TTB, which does not impose any such labeling requirements. This means that consumers currently have access to more ingredient information about nonalcoholic energy drinks than the alcoholic products. Moreover, there is no federal requirement to disclose the amount of caffeine or other additives in the products, regardless of alcohol content (although some producers of nonalcoholic energy drinks provide the information voluntarily). This is critical consumer information, particularly since some products have very high levels of caffeine.

Recommendations

Despite the limited science, we do know that alcoholic energy drinks constitute a potential danger to the health and safety of our communities, and particularly to our young people. We need not wait for more science to act. The alcohol industry's plan to market these beverages and promote the mixing of alcohol with energy drinks should be vigorously opposed before the products become even more popular. Past experience shows that a swift response is critical or the economic benefits associated with their sale will become entrenched, making regulation far more difficult or impossible.

Communities need to aggressively seek both voluntary action by the alcohol industry and government action at all levels—national, state, and local—to protect our young people from harm. Specific recommendations for actions include the following:

Actions by Beverage Producers

1. Producers of nonalcoholic energy drinks such as Red Bull should immediately halt all promotional efforts aimed at encouraging the mixing of their products with alcohol, pending further review of the safety of this practice.
2. Producers of nonalcoholic energy drinks—companies such as Hansen Natural (maker of Monster products)—should reconsider their contracts with alcoholic beverage companies to distribute their products to bars, since this association encourages the mixing of energy drinks with alcohol.
3. Alcoholic beverage producers should discontinue the production of alcoholic energy drinks pending further scientific study that demonstrates the products' safety, particularly for young people. Policymakers should operate on the basis of the precautionary principle, which places the burden of proof on the manufacturers to demonstrate that their products are safe.
4. Producers who refuse to discontinue the production and sale of alcoholic energy drinks should at a minimum, do the following:
 - Fully disclose the ingredients in all alcoholic energy drinks and the amounts of additives, including stimulants such as caffeine and guarana, contained in the drinks;
 - Disclose the percentage of alcohol derived from distilled spirits, to ensure proper classification of alcoholic energy drinks as either malt beverages or distilled spirits under applicable federal and state laws; and
 - Provide prominent health and safety warning labels on each container, alerting consumers to the risks associated with consuming alcohol with caffeine and other stimulants contained in energy drinks.
5. The alcohol industry trade associations—the Distilled Spirits Council (DISCUS) and the Beer Institute—which take responsibility for the industry's self-regulation of its marketing practices, should investigate potentially deceptive marketing practices by their member companies, specifically marketing messages that appear to promote over-consumption and that target youth.
6. Manufacturers should initiate a public service campaign alerting alcohol consumers to the risks of mixing alcohol with energy drinks.

Actions by Alcohol Distributors and Retailers

Alcoholic beverage distributors and retailers should refuse to sell alcoholic energy drinks because of the potential health and safety risks they pose in communities. Also, bars and restaurants should stop mixing energy drinks with alcohol until the safety of such drinks can be proven.

Actions by the Federal Government

1. Congress should conduct hearings to assess the health and safety risks associated with alcoholic energy drinks, focusing particularly on underage drinking. Congress should then establish a national program designed to prevent harms associated with these products. Legislation should allocate necessary funding for the design and implementation of this program and should include specific directives to the Department of Health and Human Services, the Alcohol and Tobacco Tax and Trade Bureau, the Federal Trade Commission, the Federal Drug Administration, and the Department of Justice.

Congress should also hold hearings on the marketing of alcoholic energy drinks and targeted populations. The hearings should also focus on the encouragement given by nonalcoholic energy drink companies, bars, and restaurants to mix energy drinks with alcohol.

2. The Department of Health and Human Services should conduct research on the health and safety of alcoholic energy drinks, focusing particularly on the impact on underage drinking. Research should include assessments of the biological and psychosocial effects, addictiveness, youth consumption trends, alcohol industry marketing tactics, and role in alcohol-related violence and unintentional injury. The department should also develop a national media and public awareness campaign about the risks associated with alcoholic energy drinks.
3. The Tax and Trade Bureau should investigate and disclose the ingredients found in alcoholic energy drinks and determine whether the products are properly classified as malt beverages under federal law. It should also investigate the labeling and advertising practices associated with alcoholic energy drinks to determine whether they violate applicable law that prohibits false, misleading, and unfair marketing practices.
4. The Federal Trade Commission should conduct an investigation to determine whether any of the marketing practices associated with alcoholic energy drinks consti-

tute unfair business practices or deceptive or misleading advertising claims under applicable federal law.

5. The Food and Drug Administration should investigate the health and safety implications of mixing alcohol with caffeine, guarana, and other additives associated with energy drinks and should either ban such mixtures or require strict standards that protect the health and safety of consumers. The FDA should also study the effects of combining three potentially addictive substances: alcohol, caffeine, and sweeteners.
6. In what would likely be overlapping jurisdiction, the TTB and FDA should require ingredient labeling on all alcoholic products, and on alcoholic energy drinks in particular.
7. The Department of Justice should assess the impact of alcoholic energy drinks on crime and law enforcement and should incorporate a prevention program addressing these products into its Enforcing Underage Drinking Laws program.

Actions by State Governments

1. State legislatures should either ban or strictly limit the availability of alcoholic energy drinks, limiting their sale to retail outlets for distilled spirits and imposing a special tax surcharge, with tax revenues used to fund youth prevention and treatment programs.
2. State Alcoholic Beverage Control agencies and state taxing agencies with jurisdiction should investigate whether alcoholic energy drinks are appropriately classified as malt beverages instead of distilled spirits under applicable state laws. They should also conduct retail compliance checks to determine whether retailers are selling alcoholic energy drinks to minors (in part due to the similarity between alcoholic and nonalcoholic energy drinks).
3. State attorneys general should initiate investigations of the marketing and advertising practices associated with alcoholic energy drinks and ensure that applicable state laws regarding unfair business practices and misleading and deceptive advertising laws are properly enforced.
4. State health agencies with authority to address alcohol problems should assess the impact of alcoholic energy drinks on underage drinking problems in their states and should develop prevention and treatment programs.

Actions by Local Governments

1. Local governments should ban the mixing of alcohol with energy drinks in bars.
2. Local governments with authority to regulate the retail availability of alcohol should ban or strictly limit the sale of alcoholic energy drinks to retail outlets selling distilled spirits and impose fees or taxes on these drinks. Revenues collected should be used to establish a special youth prevention and treatment fund.
3. Local health agencies should work in collaboration with state agencies to develop locally based prevention campaigns designed to alert communities to the risks associated with alcoholic energy drinks.

Action is urgently needed before alcoholic energy drinks become further entrenched in the marketplace, which in turn would create powerful economic interests determined to maintain the status quo. These beverages are still in development, with major marketing efforts undoubtedly now being devised by the major brewers, among other producers. The uproar over Spykes, including the protest by 29 state attorneys general, resulted in Anheuser Busch's withdrawal of the product. This success should be used as a first step in a similar, broader campaign that challenges the entire beverage category.

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Exhibit H



Exhibit I



Exhibit J

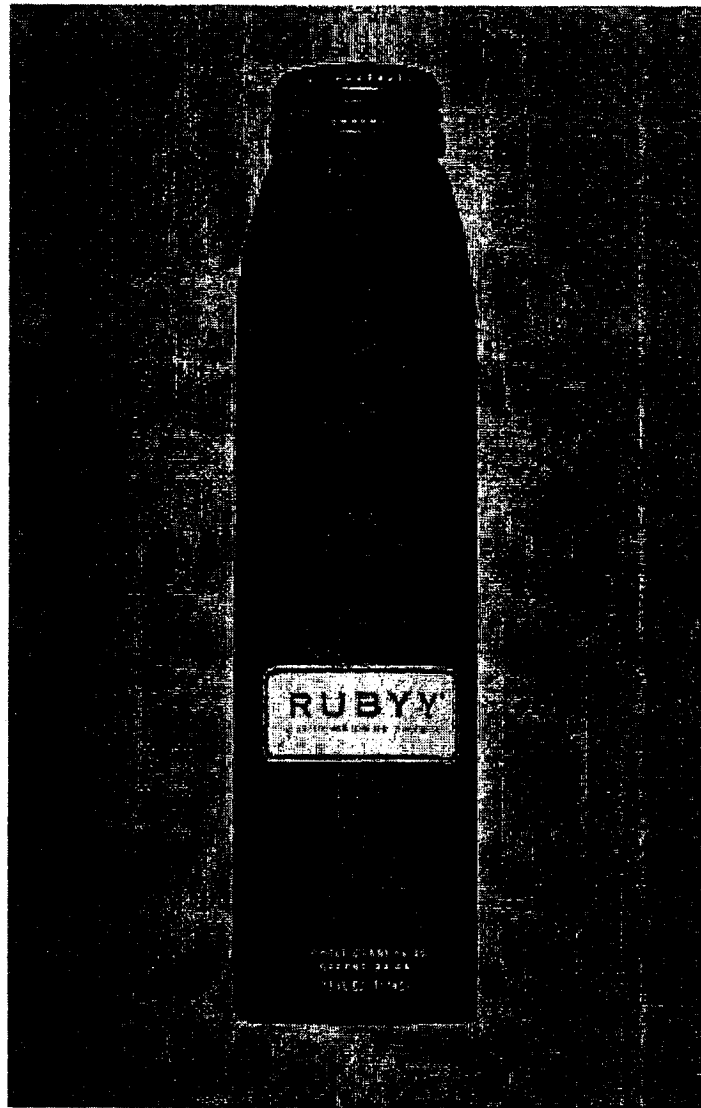


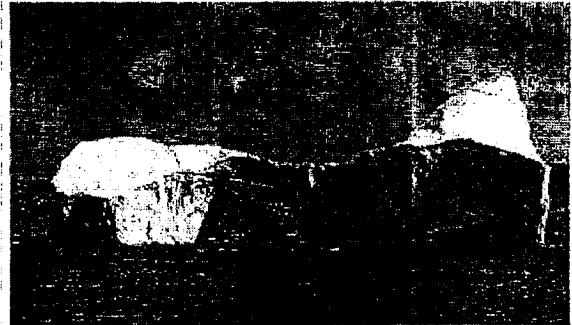
Exhibit K

Water

From Wikipedia, the free encyclopedia

Water is a ubiquitous chemical substance that is composed of hydrogen and oxygen and is essential for all forms of life.^[1]

In typical usage, *water* refers only to its liquid form or state, but the substance also has a solid state, ice, and a gaseous state, water vapor or steam. Water covers 71% of the Earth's surface^[2]. On Earth, it is found mostly in oceans and other large water bodies, with 1.6% of water below ground in aquifers and 0.001% in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation.^[3] Oceans hold 97% of surface water, glaciers and polar ice caps 2.4%, and other land surface water such as rivers, lakes and ponds 0.6%. A very small amount of the Earth's water is contained within biological bodies and manufactured products.



Water in three states: liquid, solid (ice), and (invisible) water vapor in the air. Clouds are the accumulations of the droplets, condensed from vapor-saturated air.

Water moves continually through a cycle of evaporation or transpiration (evapotranspiration), precipitation, and runoff, usually reaching the sea. Over land, evaporation and transpiration contribute to the precipitation over land.

Clean, fresh drinking water is essential to human and other lifeforms. Access to safe drinking water has improved steadily and substantially over the last decades in almost every part of the world.^{[4][5]} There is a clear correlation between access to safe water and GDP per capita.^[6] However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability.^[7] Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70 percent of freshwater is consumed by agriculture.^[8]

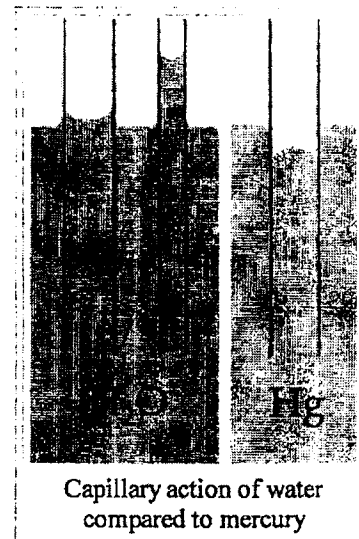
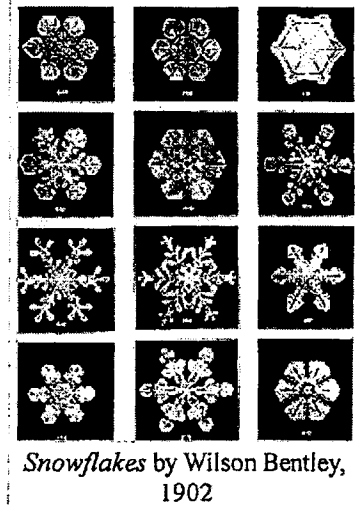
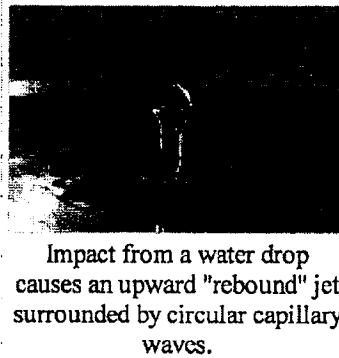
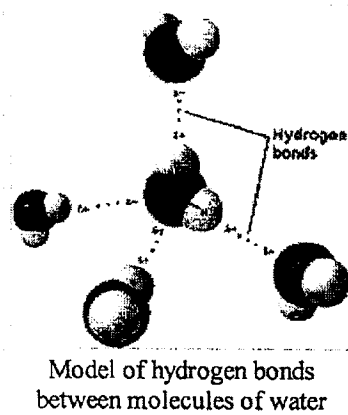
Contents

- 1 Chemical and physical properties
- 2 Taste and odor
- 3 Distribution of water in nature
 - 3.1 Water in the universe
 - 3.2 Water and habitable zone
- 4 Water on Earth
 - 4.1 Water cycle
 - 4.2 Fresh water storage

- 4.3 Sea water
- 4.4 Tides
- 5 Effects on life
 - 5.1 Aquatic life forms
- 6 Effects on human civilization
 - 6.1 Health and pollution
 - 6.2 Human uses
 - 6.2.1 Agriculture
 - 6.2.2 Water as a scientific standard
 - 6.2.3 For drinking
 - 6.2.4 Hygiene
 - 6.2.5 Chemical uses
 - 6.2.6 As a heat transfer fluid
 - 6.2.7 Extinguishing fires
 - 6.2.8 Recreation
 - 6.2.9 Water industry
 - 6.2.10 Industrial applications
 - 6.2.11 Food processing
- 7 Water politics and water crisis
- 8 Water in culture
 - 8.1 Religion
 - 8.2 Philosophy
 - 8.3 Literature
- 9 See also
 - 9.1 Other topics
- 10 References
- 11 Further reading
 - 11.1 Water as a natural resource
- 12 External links

Chemical and physical properties

Main articles: [Water \(properties\)](#), [Water \(data page\)](#), and [Water model](#)



Water is the chemical substance with chemical formula H_2O : one molecule of water has two hydrogen atoms covalently bonded to a single oxygen atom.

Water appears in nature in all three common states of matter and may take many different forms on Earth: water vapor and clouds in the sky; seawater and icebergs in the polar oceans; glaciers and rivers in the mountains; and the liquid in aquifers in the ground.

The major chemical and physical properties of water are:

- Water is a tasteless, odorless liquid at standard temperature and pressure. The color of water and ice is, intrinsically, a very light blue hue, although water appears colorless in small quantities. Ice also appears colorless, and water vapor is essentially invisible as a gas.^[9]
- Water is transparent, and thus aquatic plants can live within the water because sunlight can reach them. Only strong UV light is slightly absorbed.
- Since the water molecule is not linear and the oxygen atom has a higher electronegativity than

hydrogen atoms, it carries a slight negative charge, whereas the hydrogen atoms are slightly positive. As a result, water is a polar molecule with an electrical dipole moment. The net interactions between the dipoles on each molecule cause an effective *skin* effect at the interface of water with other substances, or air at the surface, the latter given rise to water's high surface tension. This dipolar nature contributes to water molecules' tendency to form hydrogen bonds which cause water's many special properties.^[10] The polar nature also favors adhesion to other materials.

- A result of interplay of these properties, Capillary action refers to the tendency of water to move up a narrow tube against the force of gravity. This property is relied upon by all vascular plants, such as trees.
- Water is a good solvent and is often referred to as *the universal solvent*. Substances that dissolve in water, e.g., salts, sugars, acids, alkalis, and some gases – especially oxygen, carbon dioxide (carbonation) are known as *hydrophilic* (water-loving) substances, while those that do not mix well with water (e.g., fats and oils), are known as *hydrophobic* (water-fearing) substances.
- All the major components in cells (proteins, DNA and polysaccharides) are also dissolved in water.
- Pure water has a *low* electrical conductivity, but this increases significantly with the dissolution of a small amount of ionic material such as sodium chloride.
- The boiling point of water (and all other liquids) is dependent on the barometric pressure. For example, on the top of Mt. Everest water boils at about 68 °C (154 °F), compared to 100 °C (212 °F) at sea level. Conversely, water deep in the ocean near geothermal vents can reach temperatures of hundreds of degrees and remain liquid.
- Water has the second highest specific heat capacity of any known substance, after ammonia, as well as a high heat of vaporization (40.65 kJ·mol⁻¹), both of which are a result of the extensive hydrogen bonding between its molecules. These two unusual properties allow water to moderate Earth's climate by buffering large fluctuations in temperature.
- The maximum density of water occurs at 3.98 °C (39.16 °F).^[11] Water becomes even less dense upon freezing, expanding 9%. This results in an unusual phenomenon: water's solid form, ice, floats upon water, allowing organisms to survive inside a partially-frozen water body because the water on the bottom has a temperature of around 4 °C (39 °F).

- Water is miscible with many liquids, for example ethanol, in all proportions, forming a single homogeneous liquid. On the other hand, water and most oils are *immiscible* usually forming layers according to increasing density from the top. As a gas, water vapor is completely miscible with air.
- Water forms an azeotrope with many other solvents.
- Water can be split by electrolysis into hydrogen and oxygen.
- As an oxide of hydrogen, water is formed when hydrogen or hydrogen-containing compounds burn or react with oxygen or oxygen-containing compounds. Water is not a fuel, it is an end-product of the combustion of hydrogen. The energy required to split water into hydrogen and oxygen by electrolysis or any other means is greater than the energy released when the hydrogen and oxygen recombine.^[12]
- Elements which are more electropositive than hydrogen such as lithium, sodium, calcium, potassium and caesium displace hydrogen from water, forming hydroxides. Being a flammable gas, the hydrogen given off is dangerous and the reaction of water with the more electropositive of these elements may be violently explosive.
- At ultrahigh pressures found in deep interiors of giant planets Uranus and Neptune water may become metallic, which would have important implications for the generation of the magnetic fields of these planets.



ADR label for transporting goods dangerously reactive with water

Taste and odor

Water can dissolve many different substances, giving it varying tastes and odors. Humans and other animals have developed senses which (more or less) enable them to evaluate the potability of water by avoiding water that is too salty or putrid. Humans also tend to prefer cold water to lukewarm water since cold water is likely to contain fewer microbes. The taste advertised in spring water or mineral water derives from the minerals dissolved in it: Pure H₂O is tasteless and odorless. The advertised purity of spring and mineral water refers to absence of toxins, pollutants and microbes.

Distribution of water in nature

Water in the universe

Much of the universe's water may be produced as a byproduct of star formation. When stars are born, their birth is accompanied by a strong outward wind of gas and dust. When this outflow of material eventually impacts the surrounding gas, the shock waves that are created compress and heat the gas. The water observed is quickly produced in this warm dense gas.^[13]

Water has been detected in interstellar clouds within our galaxy, the Milky Way. Water probably exists in abundance in other galaxies, too, because its components, hydrogen and oxygen, are among the most abundant elements in the universe. Interstellar clouds eventually condense into solar nebulae and solar systems such as ours.

Water vapor is present on:

- Mercury - 3.4% in the atmosphere, and large amounts of water in Mercury's exosphere^[14]
- Venus - 0.002% in the atmosphere
- Earth - trace in the atmosphere (varies with climate)
- Mars - 0.03% in the atmosphere
- Jupiter - 0.0004% in the atmosphere
- Saturn - in ices only
- Enceladus (moon of Saturn) - 91% in the atmosphere
- exoplanets known as HD 189733 b^[15] and HD 209458 b.^[16]

Liquid water is present on:

- Earth - 71% of surface
- Moon - small amounts of water have been found (in 2008) in the inside of volcanic pearls brought from Moon to Earth by the Apollo 15 crew in 1971.^[17]

Strong evidence suggests that liquid water is present just under the surface of Saturn's moon Enceladus and on Jupiter's moon Europa.

Water ice is present on:

- Earth - mainly as ice sheets
- polar ice caps on Mars
- Titan
- Europa
- Enceladus
- Comets and comet source populations (Kuiper belt and Oort cloud objects).

Water ice may be present on the Moon, Ceres, and Tethys. Water and other volatiles probably comprise much of the internal structures of Uranus and Neptune.

Water and habitable zone

The existence of liquid water, and to a lesser extent its gaseous and solid forms, on Earth is vital to the existence of life on Earth as we know it. The Earth is located in the habitable zone of the solar system; if it were slightly closer to or further from the Sun (about 5%, or about 8 million kilometres), the conditions which allow the three forms to be present simultaneously would be far less likely to exist.^{[18][19]}

Earth's gravity allows it to hold an atmosphere. Water vapor and carbon dioxide in the atmosphere provide a temperature buffer (greenhouse effect) which helps maintain a relatively steady surface temperature. If Earth were smaller, a thinner atmosphere would allow temperature extremes, thus preventing the accumulation of water except in polar ice caps (as on Mars).

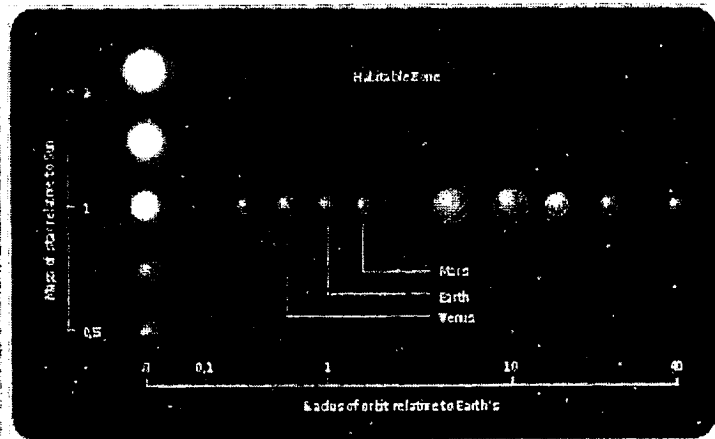
The surface temperature of Earth has been relatively constant through geologic time despite varying levels of incoming solar radiation (insolation), indicating that a dynamic process governs Earth's temperature via a combination of greenhouse gases and surface or atmospheric albedo. This proposal is known as the *Gaia hypothesis*.

The state of water on a planet depends on ambient pressure, which is determined by the planet's gravity. If a planet is sufficiently massive, the water on it may be solid even at high temperatures, because of the high pressure caused by gravity.

There are various theories about origin of water on Earth.

Water on Earth

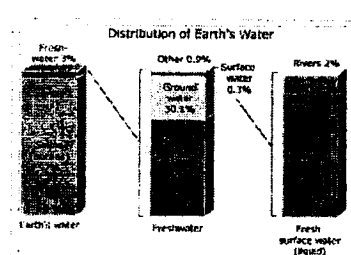
Main articles: Hydrology and Water distribution on Earth



The Solar System along center row range of possible habitable zones of varying size stars.

Hydrology is the study of the movement, distribution, and quality of water throughout the Earth. The study of the distribution of water is hydrography. The study of the distribution and movement of groundwater is hydrogeology, of glaciers is glaciology, of inland waters is limnology and distribution of oceans is oceanography. Ecological processes with hydrology are in focus of ecohydrology.

The collective mass of water found on, under, and over the surface of a planet is called the hydrosphere. Earth's approximate water volume (the total water supply of the world) is $1,360,000,000 \text{ km}^3$ ($326,000,000 \text{ mi}^3$). Of this volume:



A graphical distribution of the locations of water on Earth.

- $1,320,000,000 \text{ km}^3$ ($316,900,000 \text{ mi}^3$ or 97.2%) is in the oceans.
- $25,000,000 \text{ km}^3$ ($6,000,000 \text{ mi}^3$ or 1.8%) is in glaciers, ice caps and ice sheets.
- $13,000,000 \text{ km}^3$ ($3,000,000 \text{ mi}^3$ or 0.9%) is groundwater.
- $250,000 \text{ km}^3$ ($60,000 \text{ mi}^3$ or 0.02%) is fresh water in lakes, inland seas, and rivers.
- $13,000 \text{ km}^3$ ($3,100 \text{ mi}^3$ or 0.001%) is atmospheric water vapor at any given time.



Water covers 71% of the Earth's surface; the oceans contain 97.2% of the Earth's water. The Antarctic ice sheet, which contains 90% of all fresh water on Earth, is visible at the bottom. Condensed atmospheric water can be seen as clouds, contributing to the Earth's albedo.

Groundwater and fresh water are useful or potentially useful to humans as water resources.

Liquid water is found in bodies of water, such as an ocean, sea, lake, river, stream, canal, pond, or puddle. The majority of water on Earth is sea water. Water is also present in the atmosphere in solid, liquid, and vapor states. It also exists as groundwater in aquifers.

Water is important in many geological processes. Groundwater is ubiquitous in rocks, and the pressure of this groundwater affects patterns of faulting. Water in the mantle is responsible for the melt that produces volcanoes at subduction zones. On the surface of the Earth, water is important in both chemical and physical weathering processes. Water and, to a lesser but still significant extent, ice, are also responsible for a large amount of sediment transport that occurs on the surface of the earth. Deposition of transported sediment forms many types of sedimentary rocks, which make up the geologic record of Earth history.

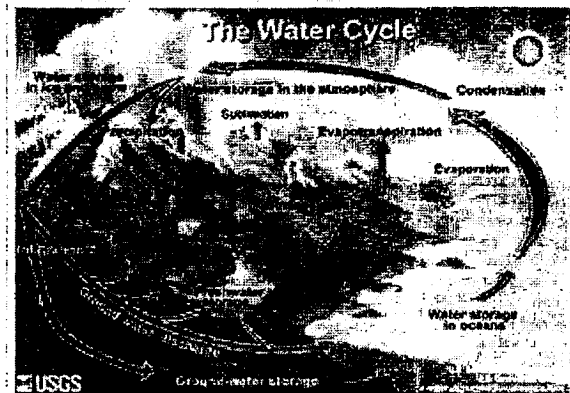
Water cycle

Main article: Water cycle

The water cycle (known scientifically as the **hydrologic cycle**) refers to the continuous exchange of water within the hydrosphere, between the atmosphere, soil water, surface water, groundwater, and plants.

Water moves perpetually through each of these regions in the *water cycle* consisting of following transfer processes:

- evaporation from oceans and other water bodies into the air and transpiration from land plants and animals into air.
- precipitation, from water vapor condensing from the air and falling to earth or ocean.
- runoff from the land usually reaching the sea.



Water cycle

Most water vapor over the oceans returns to the oceans, but winds carry water vapor over land at the same rate as runoff into the sea, about 36 Tt per year. Over land, evaporation and transpiration contribute another 71 Tt per year. Precipitation, at a rate of 107 Tt per year over land, has several forms: most commonly rain, snow, and hail, with some contribution from fog and dew. Condensed water in the air may also refract sunlight to produce rainbows.

Water runoff often collects over watersheds flowing into rivers. A mathematical model used to simulate river or stream flow and calculate water quality parameters is hydrological transport model. Some of water is diverted to irrigation for agriculture. Rivers and seas offer opportunity for travel and commerce. Through erosion, runoff shapes the environment creating river valleys and deltas which provide rich soil and level ground for the establishment of population centers. A flood occurs when an area of land, usually low-lying, is covered with water. It is when a river overflows its banks or flood from the sea. A drought is an extended period of months or years when a region notes a deficiency in its water supply. This occurs when a region receives consistently below average precipitation.

Fresh water storage

Main article: Water resources

Some runoff water is trapped for periods, for example in lakes. At high altitude, during winter, and in the far north and south, snow collects in ice caps, snow pack and glaciers. Water also infiltrates the ground and goes into aquifers. This groundwater later flows back to the surface in springs, or more spectacularly in hot springs and geysers. Groundwater is also extracted artificially in wells. This water storage is important, since clean, fresh water is essential to human and other land-based life. In many parts of the world, it is in short supply.

Sea water

Main article: Seawater

Sea water contains about 3.5% salt on average, plus smaller amounts of other substances. The physical properties of sea water differ from fresh water in some important respects. It freezes at a lower temperature (about -1.9C) and its density increases with decreasing temperature to the freezing point, instead of reaching maximum density at a temperature above freezing. The salinity of water in major seas varies from about 0.7% in the Baltic Sea to 4.0% in the Red Sea.

Tides

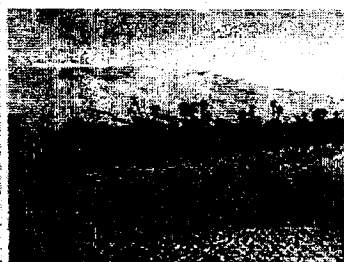
Main article: Tide

Tides are the cyclic rising and falling of Earth's ocean surface caused by the tidal forces of the Moon and the Sun acting on the oceans. Tides cause changes in the depth of the marine and estuarine water bodies and produce oscillating currents known as tidal streams. The changing tide produced at a given location is the result of the changing positions of the Moon and Sun relative to the Earth coupled with the effects of Earth rotation and the local bathymetry. The strip of seashore that is submerged at high tide and exposed at low tide, the intertidal zone, is an important ecological product of ocean tides.

Effects on life



High tide (left) and low tide (right).



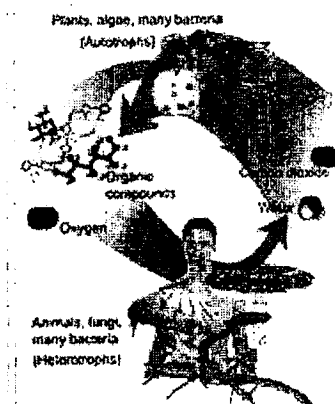
An oasis is an isolated water source with vegetation in desert

From a biological standpoint, water has many distinct properties that are critical for the proliferation of life that set it apart from other substances. It carries out this role by allowing organic compounds to react in ways that ultimately allow replication. All known forms of life depend on water. Water is vital both as a solvent in which many of the body's solutes dissolve and as an essential part of

many metabolic processes within the body. Metabolism is the sum total of anabolism and catabolism. In anabolism, water is removed from molecules (through energy requiring enzymatic chemical reactions) in order to grow larger molecules (e.g. starches, triglycerides and proteins for storage of fuels and information). In catabolism, water is used to break bonds in order to generate smaller molecules (e.g. glucose, fatty acids and amino acids to be used for fuels for energy use or other purposes). Water is thus essential and central to these metabolic processes. Therefore, without water, these metabolic processes would cease to exist, leaving us to muse about what processes would be in its place, such as gas absorption, dust collection, etc.

Water is also central to photosynthesis and respiration. Photosynthetic cells use the sun's energy to split off water's hydrogen from oxygen. Hydrogen is combined with CO₂ (absorbed from air or water) to form glucose and release oxygen. All living cells use such fuels and oxidize the hydrogen and carbon to capture the sun's energy and reform water and CO₂ in the process (cellular respiration).

Water is also central to acid-base neutrality and enzyme function. An acid, a hydrogen ion (H⁺, that is, a proton) donor, can be neutralized by a base, a proton acceptor such as hydroxide ion (OH⁻) to form water. Water is considered to be neutral, with a pH (the negative log of the hydrogen ion concentration) of 7. Acids have pH values less than 7 while bases have values greater than 7.



Overview of photosynthesis and respiration. Water (at right), together with carbon dioxide (CO₂), form oxygen and organic compounds (at left), which can be respired to water and (CO₂).



Some of the biodiversity of a coral reef

Stomach acid (HCl) is useful to digestion. However, its corrosive effect on the esophagus during reflux can temporarily be neutralized by ingestion of a base such as aluminum hydroxide to produce the neutral molecules water and the salt aluminum chloride. Human biochemistry that involves enzymes usually performs optimally around a biologically neutral pH of 7.4.

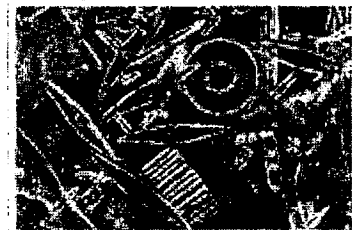
For example a cell of *Escherichia coli* contains 70% of water, a human body 60–70%, plant body up to 90% and the body of an adult jellyfish is made up of 94–98% water.

Aquatic life forms

Main articles: Hydrobiology and Aquatic plant

Earth's waters are filled with life. The earliest life forms appeared in water; nearly all fish live

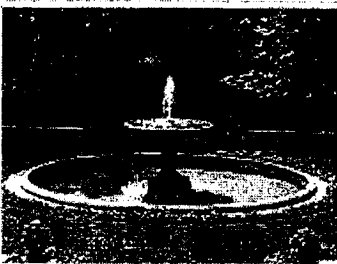
exclusively in water, and there are many types of marine mammals, such as dolphins and whales that also live in the water. Some kinds of animals, such as amphibians, spend portions of their lives in water and portions on land. Plants such as kelp and algae grow in the water and are the basis for some underwater ecosystems. Plankton is generally the foundation of the ocean food chain.



Some marine diatoms - a key phytoplankton group

Aquatic animals must obtain oxygen to survive, and they do so in various ways. Fish have gills instead of lungs, although some species of fish, such as the lungfish, have both. Marine mammals, such as dolphins, whales, otters, and seals need to surface periodically to breathe air. Smaller life forms are able to absorb oxygen through their skin.

Effects on human civilization



Water Fountain

Civilization has historically flourished around rivers and major waterways; Mesopotamia, the so-called cradle of civilization, was situated between the major rivers Tigris and Euphrates; the ancient society of the Egyptians depended entirely upon the Nile. Large metropolises like Rotterdam, London, Montreal, Paris, New York City, Buenos Aires, Shanghai, Tokyo, Chicago, and Hong Kong owe their success in part to their easy accessibility via water and the resultant expansion of trade. Islands with safe water ports, like Singapore, have flourished for the same reason. In places such as North Africa and the Middle East, where water is more scarce, access to clean drinking

water was and is a major factor in human development.

Health and pollution

Water fit for human consumption is called drinking water or potable water. Water that is not potable can be made potable by filtration or distillation (heating it until it becomes water vapor, and then capturing the vapor without any of the impurities it leaves behind), or by other methods (chemical or heat treatment that kills bacteria). Sometimes the term safe water is applied to potable water of a lower quality threshold (i.e., it is used effectively for nutrition in humans that have weak access to water cleaning processes, and does more good than harm). Water that is not fit for drinking but is not harmful for humans when used for swimming or bathing is called by various names other than potable or drinking water, and is sometimes called safe water, or "safe for bathing". Chlorine is a skin and mucous membrane irritant that is used to make water safe for bathing or drinking. Its use is highly technical and is usually monitored by government regulations (typically 1 part per million (ppm) for drinking water, and 1–2 ppm of chlorine not yet reacted with impurities for bathing water).



Environmental Science
Program, Iowa State University
student sampling water.

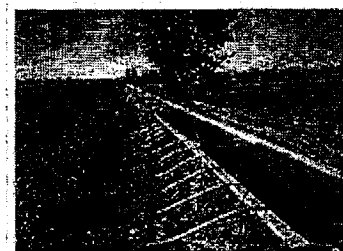
This natural resource is becoming scarcer in certain places, and its availability is a major social and economic concern. Currently, about a billion people around the world routinely drink unhealthy water. Most countries accepted the goal of halving by 2015 the number of people worldwide who do not have access to safe water and sanitation during the 2003 G8 Evian summit.^[20] Even if this difficult goal is met, it will still leave more than an estimated half a billion people without access to safe drinking water and over a billion without access to adequate sanitation. Poor water quality and bad sanitation are deadly; some five million deaths a year are caused by polluted drinking water. The World Health Organization estimates that safe water could prevent 1.4 million child deaths from diarrhea each year.^[21] Water, however, is not a finite resource, but rather re-circulated as potable water in precipitation in quantities many degrees of magnitude higher than human consumption. Therefore, it is the relatively small quantity of water in reserve in the earth (about 1 percent of our drinking water supply, which is replenished in aquifers around every 1 to 10 years), that is a non-renewable resource, and it is, rather, the distribution of potable and irrigation water which is scarce, rather than the actual amount of it that exists on the earth. Water-poor countries use importation of goods as the primary method of importing water (to leave enough for local human consumption), since the manufacturing process uses around 10 to 100 times products' masses in water.

In the developing world, 90% of all wastewater still goes untreated into local rivers and streams.^[22] Some 50 countries, with roughly a third of the world's population, also suffer from medium or high water stress, and 17 of these extract more water annually than is recharged through their natural water cycles.^[23] The strain not only affects surface freshwater bodies like rivers and lakes, but it also degrades groundwater resources.

Human uses

Agriculture

The most important use of water in agriculture is for irrigation, which is a key component to produce enough food. Irrigation takes up to 90% of water withdrawn in some developing countries^[24] and significant proportions in developed countries (United States, 30% of freshwater usage is for irrigation).^[25]



Irrigation of field crops

Water as a scientific standard

On 7 April 1795, the gram was defined in France to be equal to "the absolute weight of a volume of pure water equal to a cube of one hundredth of a metre, and to the temperature of the melting ice."^[26] For practical purposes though, a metallic reference standard was required, one thousand times more massive, the kilogram. Work was therefore commissioned to determine precisely the mass of one liter of water. In spite of the fact that the decreed definition of the gram specified water at 0 °C—a highly reproducible *temperature*—the scientists chose to redefine the standard and to perform their measurements at the temperature of highest water *density*, which was measured at the time as 4 °C (39 °F).^[27]

The Kelvin temperature scale of the SI system is based on the triple point of water, defined as exactly 273.16 K or 0.01 °C. The scale is a more accurate development of the Celsius temperature scale, which was originally defined according the boiling point (set to 100 °C) and melting point (set to 0 °C) of water.

Natural water consists mainly of the isotopes hydrogen-1 and oxygen-16, but there is also small quantity of heavier isotopes such as hydrogen-2 (deuterium). The amount of deuterium oxides or heavy water is very small, but it still affects the properties of water. Water from rivers and lakes tends to contain less deuterium than seawater. Therefore, standard water is defined in the Vienna Standard Mean Ocean Water specification.

For drinking

Main article: Drinking water



A young girl drinking bottled water

The human body is anywhere from 55% to 78% water depending on body size.^[28] To function properly, the body requires between one and seven liters of water per day to avoid dehydration; the precise amount depends on the level of activity, temperature, humidity, and other factors. Most of this is ingested through foods or beverages other than drinking straight water. It is not clear how much water intake is needed by healthy people, though most advocates agree that 6–7 glasses of water (approximately 2 litres) daily is the minimum to maintain proper hydration.^[29] Medical literature favors a lower consumption, typically 1 liter of water for an average male, excluding extra requirements due

to fluid loss from exercise or warm weather.^[30] For those who have healthy kidneys, it is rather difficult to drink too much water, but (especially in warm humid weather and while exercising) it is dangerous to drink too little. People can drink far more water than necessary while exercising, however, putting them at risk of water intoxication (hyperhydration), which can be fatal. The "fact" that a person should consume eight glasses of water per day cannot be traced back to a scientific source.^[31] There are other myths such as the effect of water on weight loss and constipation that have been dispelled.^[32]

An original recommendation for water intake in 1945 by the Food and Nutrition Board of the National Research Council read: "An ordinary standard for diverse persons is 1 milliliter for each calorie of food. Most of this quantity is contained in prepared foods."^[33] The latest dietary reference intake report by the United States National Research Council in general recommended (including food sources): 2.7 liters of water total for women and 3.7 liters for men.^[34] Specifically, pregnant and breastfeeding women need additional fluids to stay hydrated. According to the Institute of Medicine—who recommend that, on average, women consume 2.2 litres and men 3.0 litres—this is recommended to be 2.4 litres (10 cups) for pregnant women and 3 litres (12 cups) for breastfeeding women since an especially large amount of fluid is lost during nursing.^[35] Also noted is that normally, about 20 percent of water intake comes from food, while the rest comes from drinking water and beverages (caffeinated included). Water is excreted from the body in multiple forms; through urine and feces, through sweating, and by exhalation of water vapor in the breath. With physical exertion and heat exposure, water loss will increase and daily fluid needs may increase as well.

Humans require water that does not contain too many impurities. Common impurities include metal salts and oxides (including copper, iron, calcium and lead)^[36] and/or harmful bacteria, such as *Vibrio*. Some solutes are acceptable and even desirable for taste enhancement and to provide needed electrolytes.^[37]

The single largest freshwater resource suitable for drinking is Lake Baikal in Siberia, which has a very low salt and calcium content and is therefore very clean.

Hygiene

The ability of water to make solutions and emulsions is used for washing. Many industrial processes rely on reactions using chemicals dissolved in water, suspension of solids in water slurries or using water to dissolve and extract substances.

Chemical uses

Water is widely used in chemical reactions as a solvent or reactant and less commonly as a solute or catalyst. In inorganic reactions, water is a common solvent, dissolving many ionic compounds. In organic reactions, it is not usually used as a reaction solvent, because it does not dissolve the reactants well and is amphoteric (acidic *and* basic) and nucleophilic. Nevertheless, these properties are sometimes desirable. Also, acceleration of Diels-Alder reactions by water has been observed. Supercritical water has recently been a topic of research. Oxygen-saturated supercritical water combusts organic pollutants efficiently.

As a heat transfer fluid





Ice used for cooling.

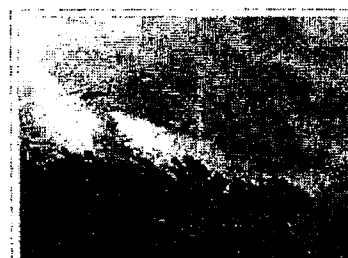
Water and steam are used as heat transfer fluids in diverse heat exchange systems, due to its availability and high heat capacity, both as a coolant and for heating. Cool water may even be naturally available from a lake or the sea. Condensing steam is a particularly efficient heating fluid because of the large heat of vaporization. A disadvantage is that water and steam are somewhat corrosive. In almost all electric power stations, water is the coolant, which vaporizes and drives steam turbines to drive generators. In the U.S., cooling power plants is the largest use of water.^[25]

In the nuclear industry, water can also be used as a neutron moderator. In a pressurized water reactor, water is both a coolant and a moderator. This provides a passive safety measure, as removing the water from the reactor also slows the nuclear reaction down.

Extinguishing fires

Water has a high heat of vaporization and is relatively inert, which makes it a good fire extinguishing fluid. The evaporation of water carries heat away from the fire. However, water cannot be used to fight fires of electric equipment, because impure water is electrically conductive, or of oils and organic solvents, because they float on water and the explosive boiling of water tends to spread the burning liquid.

Use of water in fire fighting should also take into account the hazards of a steam explosion, which may occur when water is used on very hot fires in confined spaces, and of a hydrogen explosion, when substances which react with water, such as certain metals or hot graphite, decompose the water, producing hydrogen gas.



Water is used for fighting wildfires.

The power of such explosions was seen in the Chernobyl disaster, although the water involved did not come from fire-fighting at that time but the reactor's own water cooling system. A steam explosion occurred when the extreme over-heating of the core caused water to flash into steam. A hydrogen explosion may have occurred as a result of reaction between steam and hot zirconium.

Recreation

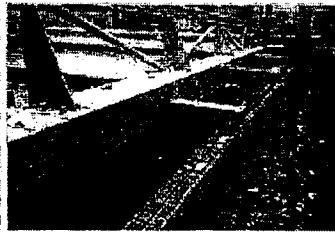
Main article: Water sport (recreation)

Humans use water for many recreational purposes, as well as for exercising and for sports. Some of these include swimming, waterskiing, boating, surfing and diving. In addition, some sports, like ice hockey and ice skating, are played on ice. Lakesides, beaches and waterparks are popular places for people to go to relax and enjoy recreation. Many find the sound and appearance of flowing water to be calming, and fountains and other water features in public or private decorations.. Some keep fish and other life in aquariums or ponds for show, fun, and companionship. Humans also use water for snow sports i.e. skiing, sledding, snowmobiling or snowboarding, which requires the water to be frozen. People may also use water for play fighting such as with snowballs, water guns or water balloons.

Water industry



A manual water pump in China



Water purification facility

Main



A water-carrier in India, 1882. In many places where running water is not available, water has to be transported by people.

*articles: Water industry and
:Category:Water supply and sanitation by country*

The water industry provides drinking water and wastewater services (including sewage treatment) to households and industry. Water supply facilities includes for example water wells cisterns for rainwater harvesting, water supply network, water purification facilities, water tanks, water towers, water pipes including old aqueducts. Atmospheric water generators are in development.

Drinking water is often collected at springs, extracted from artificial borings (wells) in the ground, or pumped from lakes and rivers. Building more wells in adequate places is thus a possible way to produce more water, assuming the aquifers can supply an adequate flow. Other water sources include rainwater collection. Water may require purification for human consumption. This may involve removal of undissolved substances, dissolved substances and harmful microbes. Popular methods are filtering with sand which only removes undissolved material, while chlorination and boiling kill harmful microbes. Distillation does all three functions. More advanced techniques exist, such as reverse osmosis. Desalination of abundant seawater is a more expensive solution used in coastal arid climates.

The distribution of drinking water is done through municipal water systems, tanker delivery or as bottled water. Governments in many countries have programs to distribute water to the needy at no charge. Others argue that the market mechanism and free enterprise are best to manage this rare resource and to finance the boring of wells or the construction of dams and reservoirs.

Reducing usage by using drinking (potable) water only for human consumption is another option. In some cities such as Hong Kong, sea water is extensively used for flushing toilets citywide in order to conserve fresh water resources.

Polluting water may be the biggest single misuse of water; to the extent that a pollutant limits other uses of the water, it becomes a waste of the resource, regardless of benefits to the polluter. Like other types of pollution, this does not enter standard accounting of market costs, being conceived as externalities for which the market cannot account. Thus other people pay the price of water pollution, while the private firms' profits are not redistributed to the local population victim of this pollution. Pharmaceuticals consumed by humans often end up in the waterways and can have detrimental effects on aquatic life if they bioaccumulate and if they are not biodegradable.

Wastewater facilities are storm sewers and wastewater treatment plants. Another way to remove pollution from surface runoff water is bioswale.

Industrial applications

Water is used in power generation. Hydroelectricity is electricity obtained from hydropower. Hydroelectric power comes from water driving a water turbine connected to a generator. Hydroelectricity is a low-cost, non-polluting, renewable energy source. The energy is supplied by the sun. Heat from the sun evaporates water, which condenses as rain in higher altitudes, from where it flows down.



Three Gorges Dam is the largest hydro-electric power station

Pressurized water is used in water blasting and water jet cutters. Also, very high pressure water guns are used for precise cutting. It works very well, is relatively safe, and is not harmful to the environment. It is also used in the cooling of machinery to prevent over-heating, or prevent saw blades from over-heating.

Water is also used in many industrial processes and machines, such as the steam turbine and heat exchanger, in addition to its use as a chemical solvent. Discharge of untreated water from industrial uses is pollution. Pollution includes discharged solutes (chemical pollution) and discharged coolant water (thermal pollution). Industry requires pure water for many applications and utilizes a variety of purification techniques both in water supply and discharge.

Food processing



Water can be used to cook foods such as noodles.

Water plays many critical roles within the field of food science. It is important for a food scientist to understand the roles that water plays within food processing to ensure the success of their products.

Solutes such as salts and sugars found in water affect the physical properties of water. The boiling and freezing points of water is affected by solutes. One mole of sucrose (sugar) per kilogram of water raises the boiling point of water by 0.51 °C, and one mole of salt per kg raises the boiling point by 1.02 °C; similarly, increasing the number of dissolved particles lowers water's freezing point.^[38] Solutes in water also affect water activity which affects many chemical reactions and the growth of microbes in food.^[39] Water activity can be described as a ratio of the vapor pressure of water in a

solution to the vapor pressure of pure water.^[38] Solutes in water lower water activity. This is important to know because most bacterial growth ceases at low levels of water activity.^[39] Not only does microbial growth affect the safety of food but also the preservation and shelf life of food.

Water hardness is also a critical factor in food processing. It can dramatically affect the quality of a product as well as playing a role in sanitation. Water hardness is classified based on the amounts of removable calcium carbonate salt it contains per gallon. Water hardness is measured in grains; 0.064 g calcium carbonate is equivalent to one grain of hardness.^[38] Water is classified as soft if it contains 1 to 4 grains, medium if it contains 5 to 10 grains and hard if it contains 11 to 20 grains.^[38] The hardness of water may be altered or treated by using a chemical ion exchange system. The hardness of water also affects its pH balance which plays a critical role in food processing. For example, hard water prevents successful production of clear beverages. Water hardness also affects sanitation; with increasing hardness, there is a loss of effectiveness for its use as a sanitizer.^[38]

Boiling, steaming, and simmering are popular cooking methods that often require immersing food in water or its gaseous state, steam. While cooking water is used for dishwashing too.

Water politics and water crisis

Main articles: Water politics and Water crisis

See also: Water resources, Water law, and Water right

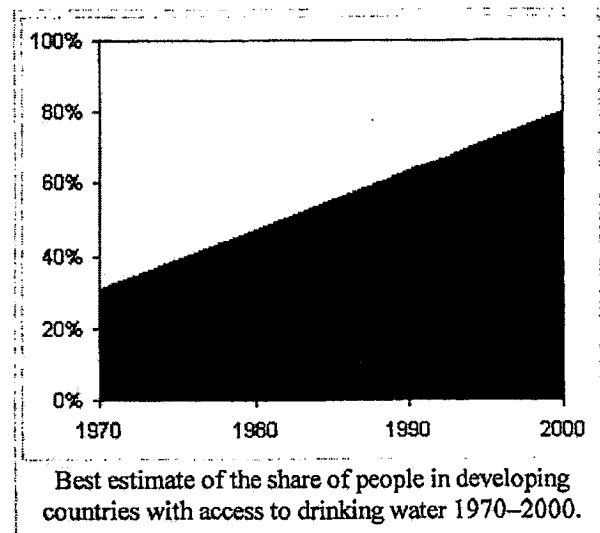
Water politics is politics affected by water and water resources. For this reason, water is a strategic resource in the globe and an important element in many political conflicts. It causes health impacts and damage to biodiversity.

1.6 billion people have gained access to a safe water source since 1990 [1] (http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2008/MDG_Report_2008_En.pdf#page=44). The proportion of people in developing countries with

access to safe water is calculated to have improved from 30 percent in 1970^[4] to 71 percent in 1990, 79 percent in 2000 and 84 percent in 2004. This trend is projected to continue.^[5] To halve, by 2015, the proportion of people without sustainable access to safe drinking water is one of the Millennium Development Goals. This goal is projected to be reached.

A 2006 United Nations report stated that "there is enough water for everyone", but that access to it is hampered by mismanagement and corruption.^[40]

UNESCO's World Water Development Report (WWDR, 2003) from its World Water Assessment Program indicates that, in the next 20 years, the quantity of water available to everyone is predicted to decrease by 30 percent. 40 percent of the world's inhabitants currently have insufficient fresh water for minimal hygiene. More than 2.2 million people died in 2000 from waterborne diseases (related to the



consumption of contaminated water) or drought. In 2004, the UK charity WaterAid reported that a child dies every 15 seconds from easily preventable water-related diseases; often this means lack of sewage disposal; see toilet.

Organizations concerned in water protection include International Water Association (IWA), WaterAid, Water 1st, American Water Resources Association (<http://www.awra.org/>) . Water related conventions are United Nations Convention to Combat Desertification (UNCCD), International Convention for the Prevention of Pollution from Ships, United Nations Convention on the Law of the Sea and Ramsar Convention. World Day for Water takes place on 22 March and World Ocean Day on 8 June.

Water used in the production of a good or service is virtual water.

Water in culture

Religion

Water is considered a purifier in most religions. Major faiths that incorporate ritual washing (ablution) include Christianity, Hinduism, Rastafarianism, Islam, Shinto, Taoism, and Judaism. Immersion (or aspersion or affusion) of a person in water is a central sacrament of Christianity (where it is called baptism); it is also a part of the practice of other religions, including Judaism (*mikvah*) and Sikhism (*Amrit Sanskar*). In addition, a ritual bath in pure water is performed for the dead in many religions including Judaism and Islam. In Islam, the five daily prayers can be done in most cases (see *Tayammum*) after completing washing certain parts of the body using clean water (*wudu*).

In Shinto, water is used in almost all rituals to cleanse a person or an area (e.g., in the ritual of *misogi*). Water is mentioned in the Bible 442 times in the New International Version and 363 times in the King James Version: 2 Peter 3:5(b) states, "The earth was formed out of water and by water" (NIV).

Some faiths use water especially prepared for religious purposes (holy water in some Christian denominations, *Amrita* in Sikhism and Hinduism). Many religions also consider particular sources or bodies of water to be sacred or at least auspicious; examples include Lourdes in Roman Catholicism, the Jordan River (at least symbolically) in some Christian churches, the Zamzam Well in Islam and the River Ganges (among many others) in Hinduism.

Water is often believed to have spiritual powers. In Celtic mythology, Sulis is the local goddess of thermal springs; in Hinduism, the Ganges is also personified as a goddess, while Saraswati have been referred to as goddess in Vedas. Also water is one of the "panch-tatva"s (basic 5 elements, others including fire, earth, space, air). Alternatively, gods can be patrons of particular springs, rivers, or lakes: for example in Greek and Roman mythology, Peneus was a river god, one of the three thousand Oceanids.

Philosophy

The Ancient Greek philosopher Empedocles held that water is one of the four classical elements along with fire, earth and air, and was regarded as the ylem, or basic substance of the universe. Water was considered cold and moist. In the theory of the four bodily humors, water was associated with phlegm.



A Hindu ablution as practiced in Tamil Nadu

The classical element of Water was also one of the five elements in traditional Chinese philosophy, along with earth, fire, wood, and metal.

Water is also taken as a role model in some parts of traditional and popular Asian philosophy. James Legge's 1891 translation of the Dao De Jing states "The highest excellence is like (that of) water. The excellence of water appears in its benefiting all things, and in its occupying, without striving (to the contrary), the low place which all men dislike. Hence (its way) is near to (that of) the Tao" and "There is nothing in the world more soft and weak than water, and yet for attacking things that are firm and strong there is nothing that can take precedence of it;--for there is nothing (so effectual) for which it can be changed."^[41]

Literature

Water is used in literature as a symbol of purification. Examples include the critical importance of a river in *As I Lay Dying* by William Faulkner and the drowning of Ophelia in *Hamlet*.

See also

Main article: Outline of water

Water is described in many terms and contexts:

- **according to state**
 - solid - ice
 - liquid - water
 - gaseous - water vapor
- **according to meteorology:**
 - hydrometeor
 - precipitation

precipitation according to movement

- vertical (falling) precipitation
 - rain
 - freezing rain
 - drizzle
 - freezing drizzle
 - snow
 - snow pellets
 - snow grains
 - ice pellets
 - frozen rain
 - hail
 - ice crystals
- horizontal (seated) precipitation
 - dew
 - hoarfrost
 - atmospheric icing

precipitation according to state

- liquid precipitation
 - rain
 - freezing rain
 - drizzle
 - freezing drizzle
 - dew
- solid precipitation
 - snow
 - snow pellets
 - snow grains
 - ice pellets
 - frozen rain
 - hail
 - ice crystals
 - hoarfrost
 - atmospheric icing

- glaze ice
- glaze ice
- mixed precipitation
 - in temperatures around 0 °C
- levitating particles
 - clouds
 - fog
 - mist
- ascending particles (drifted by wind)
 - spindrift
 - *stirred snow*
- **according to occurrence**
 - groundwater
 - meltwater
 - meteoric water
 - connate water
 - fresh water
 - surface water
 - mineral water – contains many minerals
 - brackish water
 - dead water – strange phenomenon which can occur when a layer of fresh or brackish water rests on top of denser salt water, without the two layers mixing. It is dangerous for ship traveling.
 - seawater
 - brine
- **according to uses**
 - tap water
 - bottled water
 - drinking water or potable water – useful for everyday drinking, without fouling, it contains balanced minerals that are not harmful to health (see below)
 - purified water, laboratory-grade, analytical-grade or reagent-grade water – water which has been highly purified for specific uses in science or engineering. Often broadly classified as Type I, Type II, or Type III, this category of water includes, but is not limited to the following:
 - distilled water
 - double distilled water
 - deionized water
- **according to other features**
 - soft water – contains less minerals
 - hard water – from underground, contains more minerals
 - distilled water, double distilled water, deionized water - contains no minerals
 - Water of crystallization — water incorporated into crystalline structures
 - Hydrates — water bound into other chemical substances
 - heavy water – made from heavy atoms of hydrogen - deuterium. It is in nature in normal water in very low concentration. It was used in construction of first nuclear reactors.
 - tritiated water

- according to microbiology
 - drinking water
 - wastewater
 - stormwater or surface water
- according to religion
 - holy water

Other topics

- Dihydrogen monoxide hoax
- Water Pasteurization Indicator
- Water intoxication

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